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THE Chemical Age

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will change its name to

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PEST CONTROL LTD

Fisons Pest Control Ltd. will continue to trade independently as previously and its headquarters will remain at Bourn, Cambridge.

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The Fuel Topic

WITH the singers gone from the doorsteps and poor men gathering winter fuel not likely to come into sight or sound again for another year, it is a fitting time to consider the national fuel and power problem. To have embarked on so gloomy a subject immediately before Christmas would hardly have struck a seasonal note, so we delayed our response to Mr. K. T. Spencer's admirable address and plea at the recent DSIR Conference on Research and Industrial Productivity. Mr. Spencer, chief scientist at the Ministry of Fuel and Power, is an appropriate person to focus industrial attention upon this fundamental problem, the supply of fuel and energy; that supply is the responsibility of his Ministry, and senior officials do not dwell upon deficiencies or difficulties if they are not in fact realities. British industry grew up and won world leadership when coal was cheap and abundant here; now that cheapness and abundance has gone for ever.

It is especially in recent years that the lack of balance between our coal production and our coal needs has revealed itself as a constant rather than occasional defect. A severe winter may accentuate the facts, but it is clear that they are perpetually present. The National Coal Board originally estimated for a total demand by 1965 of 205-215,000,000 tons of coal a year with an additional export demand of 25-35,000,000 tons. The target set was for a production of 240,000,000 tons by 1960-65. However, inland demand over the past two or three years, in spite of the domestic restrictions, has been running at a level of over 200,000,000 tons a year. It is estimated that 1954's usage will prove to be 7,000,000 tons higher than that of 1953. The gap between need and supply is already widening sharply. It could well amount to 20,000,000 tons by 1960.

Can nuclear energy enter the picture in time? The latest predictions (Sir John Cockcroft's) suggest that by 1965-70 enough experience in operating power units will have been gained for atomic power provision on 'a scale adequate to do the job of 20,000,000 tons of coal a year.' It might be possible for this development to be speeded up 'if the need is great.' There is, therefore, some prospect that by 1960 or 1962 a coal deficiency amounting to 20,000,000 tons can be balanced by atomic power—but not before then. Over the next five or six years the gap between coal needs and supply seems likely to grow at dangerous pace, and in that period there can be little help from non-coal sources of energy. Furthermore, we might note that advance estimates of coal requirements have been consistently under-assessed, and we might still be under-assessing the demand from industry in, say, 1958. The present recovery in our manufacturing industries has been greater than was expected—it has inevitably required more fuel and more power. Such a trend, favourable enough from the general viewpoint of national prosperity, might continue without recessions. But fuel supply could then and all too easily become the Achilles heel of industrial expansion and prosperity. Importing coal as an industrial raw material is not a palatable addition to our present list of necessary raw material imports; however, in the current year this has been

necessary up to an amount of some 4,000,000 tons. It has already had its incidental impact upon our trading conditions; one of the factors contributing to the current rise in sea freight costs is the demand made upon cargo space by our own coal imports.

Mr. Spencer's argument that the gap will be one of great seriousness in the next five, and perhaps ten, years is not in any way exaggerated. Indeed, it could be falsified only by an industrial depression that brought its own reduction in coal requirements. There are only three ways to try bridging the gap—increase coal output from the mines, increase oil imports, increase the efficiency of fuel utilisation. They are easy enough to state.

An increase in coal output cannot be relied upon. Mining productivity has not so far displayed a substantial increase, although there has been a heavy input of extra mechanisation. Mr. Spencer established this grim point by comparing coal-mining productivity with that of agriculture, showing that the effect of mechanising farming had been far more striking; he drew a very odd comparison here for it is the view of a number of agricultural economists that farming output per man has by no means justified the modern scale of investment in farm machinery. However, this does not reduce the strength of his argument; rather, it emphasises its validity with even grimmer force. A comparison with the effects of mechanisation upon factory productivity would perhaps have been too painful to make. Furthermore, coal quality is falling, partly as a result of mechanisation itself, partly because so many of the better seams have been worked out. If the Chief Scientist of the Ministry of Fuel and Power cannot be more optimistic about the prospects of a rising output of coal at home, pessimism would seem to be generally justified.

Increasing our importations of oil is the easiest and quickest solution. It enlarges our dependence upon raw materials from overseas, of course; it has formidable strategic dangers; but there are the prospects of ultimate relief from atomic power (though it might be pointed out that atomic power must also be based upon imported raw material!). There is always the chance that the present search for natural gas in the United Kingdom might be successful; if this cannot be counted upon, it need not be completely ignored. The British Electricity Authority is providing its newest power stations with dual-firing equipment for using either coal or oil; the Gas Board has already expressed a preference for plans to produce gas from oil rather than for total gasification of coal processes. The steel industry has already built up an annual usage of over 1,000,000 tons of oil in the place of coal.

But the third means of solution, increasing the efficiency with which we use coal, should be the most hopeful and should bring the greatest relief. It is up to industry to help itself, for ultimately a coal supply gap that cannot be bridged must lead to restrictions in consumption of a less acceptable nature than those that have to be faced today. There are huge differences between branches of industry in coal requirement per £100 or per £1000 of product. Comparisons of efficiency in fuel utilisation cannot be drawn too broadly. But within the same branch of industry, fuel utilisation efficiencies show alarming variations from factory to factory. The average yield per ton of coal in breweries is 40 barrels of beer; the highest yield yet measured is 112 barrels, the lowest is 18.5. In laundries, an average weight of 1 ton of goods is washed for each ton of coal used; the highest yield measured is 5 tons, the lowest is only 8 hundredweights. It would hardly be possible to arrive at similar data for the chemical industry owing to the diversity of factory processes within the industry, but there is no reason to assume that similar differences in fuel usage efficiency do not exist. Mr. Spencer's plea that industrial research associations should apply their thoughts and influence in this direction is sound and stimulating; the tasks involved would be short-term and advisory rather than long-term and experimental, and most of the information needed for a fuel economy advisory campaign is already in existence. Nor is Mr. Spencer's second suggestion any less practical. Companies with departments that study such matters as time and methods, production planning, etc., should include the problem of fuel economy with these activities.

Notes & Comments

Gas Underground

A DEVELOPMENT believed to be entirely new in this country is the proposed use of a Billingham rock-salt mine by the Northern Gas Board as a gasholder. Thus, while the search for natural reservoirs of gas continues, a synthetic underground reservoir is to be created for storing gas won from coal. The idea is not new, and in the United States the exhausted caverns of natural gas production have been successfully used for gas storage. The Billingham project is unlikely to use former workings of rock-salt mining; rather, it is understood that a new cavity will be dug out. It may be wondered whether the production of this specially shaped cavity will add a temporary tonnage to the country's normal supply of salt. The costs of creating this geological gasometer will be in the region of about £100,000, but this is an attractive figure when set against the costs of building a surface gasholder of similar capacity, which would be £400,000 or £500,000. Whether the running costs of the salt-mine gasholder will be lower than those of surface gasholders depends upon the method of use; a compression plant must be operated for this type of gas storage, but the demands upon it will be lessened if the gas is not frequently drawn off. The expected capacity of the salt-mine holder is of the order of 10,000,000 cubic feet of gas, or about 13 per cent of the present storage capacity in the entire Northern Gas Board area.

Continuous Cyanamide

CALCIUM cyanamide is normally manufactured by batch method, the reaction between calcium carbide and nitrogen taking place in an electric furnace. A new German process is continuous (USP. 2,687,945), and is based upon vapour phase reaction between finely pulverised carbide and nitrogen. A solid-gas suspension composed of the pulverised calcium carbide and a hydrocarbon gas under pressure is fed to a refractory brick chamber. There it comes into contact with pre-heated nitrogen, and excess hydrocarbon gas and oxygen are also fed into the reaction chamber to assist in maintaining the required temperature. A high-temperature zone in the middle of the chamber enables a high yield of calcium cyanamide to be obtained; below this zone the entrance of cooled gases causes a sharp lowering of temperature and this leads to product separation. Any elementary carbon also produced is removed by passing oxygen up through the cyanamide accumulating at the reaction chamber's outlet.

Questions of Cost

THE economic prospects of this new process seem unusually interesting. Continuous manufacture is likely to have lower working costs than batch methods of production. But will the cost of deriving the heat for this high-temperature reaction from hydrocarbon gas instead of from an electric furnace offset the advantage? For calcium carbide is the main raw material, and calcium carbide must first be produced by an electro-chemical process. Therefore, an economic site for cyanamide production will be adjacent to an economic site for carbide production, that is to say, where electric power is cheap, e.g., Norway. Calcium cyanamide has tended to become a neglected fertiliser since the war, but its special merits as a nitrogenous fertiliser have not vanished. It has an initially toxic effect that is useful for weed-killing; this effect disappears and the nitrogen supply is then beneficial to crops. Increased cyanamide production would almost certainly find a ready market in Western Europe.

Odds on Aureomycin

THE fact that aureomycin and some other antibiotics can act as growth-increasing food supplements is well known by breeders of pigs and poultry. The fact that aureomycin will do the same thing with racehorses has so far

attracted much less attention though it may eventually have quite remarkable consequences. A 'Food of the Gods' for the 'Sport of Kings' might reasonably be listed as one of the dramatic discoveries of 1954. Foals given as little as 1/280th of an ounce of aureomycin per day during their first three months of life and twice this amount for the next six months have gained weight at least 10 per cent more rapidly than is normal. The rate of gain over the first few months of development is actually 14 per cent higher. This has been quite clearly established by a 1953/54 experiment jointly organised by the Agricultural Research Council and the National Stud. Twelve foals born in the spring of 1953 were divided into two groups of six, a control group and a test group receiving the aureomycin supplements. At five months of age the treated foals averaged 60 lb. more in weight than the control group.

Photo Finish

A SINGLE experiment so far conducted and reported (see *The Veterinary Record*, 27 November) was too limited in aim and design to throw light upon the really intriguing questions that are raised. The aureomycin daily doses were stopped when the foals were nine months old. By the time they were all 13 months old the untreated foals had made up most of the leeway; at any rate, the aureomycin-fed foals were then only 7 per cent more advanced in weight-gain and this difference was not statistically significant in an experiment involving so few animals and so many natural variables. But it is natural to wonder what would have happened if aureomycin supply had continued after the age of nine months, and as the early progress of this experiment had given such promising indications it is surprising that two or three of the foals were not given continued treatment. Nor can any conclusions be drawn as to whether genuine maturity is reached more quickly. Is it only weight-gain that is accelerated? Or can we expect foals to be ready for training at an earlier age?—with the spectacular possibilities of getting the racing performance of a three-year old at an age of two or two and a half years? This can be tested only by using foals from top-class racing stock. In this initial experiment, for reasons of economy, foals from relatively poor stock were used, foals that in any case were unlikely to have racing careers. There is only one clue and that is negative and inconclusive—regular X-ray photographs of the fetlock joints of the foals did not show any advancement of bone development as a result of aureomycin additions to diet.

S for Standard

COMMON mis-use of the word 'plastic' when describing articles made from various types of plastics was discussed at a recent meeting of the Council of the British Plastics Federation. It was pointed out that there is the authority of the British Standards Institution for writing plastics with a final 's', this being included in BS.1755, 'Glossary of Terms Used in the Plastics Industry,' published in 1951. Plastics are defined as: 'A wide group of solid composite materials which are largely organic, usually based on synthetic resins or upon modified polymers of natural origin and possessing appreciable mechanical strength. At a suitable stage in their manufacture most plastics can be cast, moulded or directly polymerised to shape. Some plastics are rubberlike, while some chemically modified forms of rubber are considered to be plastics.' The glossary continues: 'the noun may be used adjectively to describe an article or substance as being composed of, or as being, a material in the group mentioned in the definition. Used thus the word is distinguished by its terminal 's' from the adjective 'plastic' signifying the susceptibility of a material to plastic deformation.' The Council decided to encourage the widest possible use of the terminal 's' in the adjective in accordance with the British Standard.

The death occurred on 22 December of MR. WILLIAM VERNON HITCHENOR, of Bingley, at the age of 47, following a short illness. Mr. Hitchenor was a technical representative for Benjamin R. Vickers and Sons, Ltd. Leeds.

New Synthetic Rubber Plan in Germany

Another Polythene Plant Under Construction

THE production of synthetic rubber in the Federal Republic is still limited to several thousand tons a year but Chemische Werke Hüls GmbH, the only producer in West Germany, is known to have been working for some time on several alternative schemes for the large-scale manufacture of synthetic rubber. An annual capacity of about 30,000 tons is regarded as the economic minimum, and plans have been prepared for erection of a plant of this size. The problem of finance which at times appeared to be insuperable seems to have been solved thanks to the interest shown by German rubber users and the Federal authorities. More difficult, however, has been the question of what raw material to use in a large-scale synthetic rubber plant.

At one time it was thought that surplus alcohol might be obtained on advantageous terms from France. More recently the choice has been between *n*-butane, which would have to be imported from the USA, and butadiene produced in Germany from crude oil. A provisional decision seems now to have been taken in favour of butane; about 50,000 tons of this would be needed annually. It is expected that some DM. 120,000,000 would be required for plant expenditure and to provide adequate working capital while the cost of the imported butane would be about DM. 15,000,000 a year. For production from butadiene more than DM. 160,000,000 capital would be needed and the cost of the raw material would be DM. 21,000,000 a year.

Difference in Costs

Butane is thus preferable as a starting material on the grounds of both economy in capital expenditure and saving of foreign currency, but the cost of the synthetic rubber compares unfavourably with the price of imported natural rubber. Chemische Werke Hüls is therefore negotiating with the Federal Ministry of Finance about ways of eliminating this difference in costs. Plans which may have been entertained earlier to base large-scale synthetic rubber production on coal and lime have been definitely abandoned in view of the high cost of coal. Dependence on a petroleum derivative as the starting material of synthetic rubber production is now thought to be essential in existing economic conditions.

The production of polythene will be undertaken by Farbwerke Höchst AG which is now erecting an oil cracking plant. Until recently the production of plastics and solvents at Höchst was based entirely on carbide. The decision to erect an oil cracking plant was taken in order to provide a broader raw material basis for the production of synthetic fibres and plastics. Part of the ethylene output from the new source will be used to produce polythene by the Ziegler process under a licence from the Working Group for Olefine Chemistry. Work on the erection of this polythene plant, however, does not yet seem to have started. Two Ruhr companies, Ruhrchemie AG of Oberhausen-Holten and Bergwerksgesellschaft Hibernia AG of Herne, are reported to be already operating plant for polythene production by the same process, probably starting from a coal derivative.

New Company in Brazil

Farbwerke Höchst AG is directly interested in a new enterprise in Brazil for the production of caustic soda, chlorine, solvents, textile agents and other chemicals. Among the founders of the new company are R. W. Grace & Co., a US concern with chemical and other interests in South America. The new Brazilian company has a capital of some $6,000,000 and will be able to draw on a loan from the Export and Import Bank in Washington.

German chemical exporters expect to benefit from increased trade exchanges under a number of new agreements negotiated in recent months. Rumania, which is importing $1,900,000 worth of German chemicals this year, has fixed a quota of $5,000,000 for imports of German chemicals next year. Negotiations now under way with Chile are expected to provide greater opportunities for German chemicals in that South American market. German chemical exports to Greece showed an increase this year as a result of increased purchases of Greek tobacco by Germany. Shipments of chemicals to Egypt, on the other hand, do not

appear to have maintained fully last year's increase, probably due to fluctuations in German purchases of Egyptian cotton.

Some concern is felt in the West German potash industry in view of the increasing evidence of dumping by the Soviet zone potash industry which has caused the US Treasury to instruct the Tariff Commission to open an inquiry into the subject. US exporters have been complaining that Soviet zone potash has been offered in various markets at prices substantially below the world market level. Potash is one of the main surplus commodities available for export in the Soviet zone but in view of the priority given to shipments to Iron Curtain markets it is doubtful whether Soviet zone potash can play a major part in western markets. Potash exports from the Soviet zone of Germany appear to fluctuate a great deal, not only because of fluctuating demands from the eastern countries but as a result of recurring transport difficulties.

Research Fellowships

FIVE young British scientists have been awarded research fellowships tenable in American institutions under a technical assistance programme sponsored by the US Foreign Operations Administration. The awards were made by the National Academy of Sciences, Washington, on the nomination of the Royal Society. The scientists include: RICHARD A. GIBBON, B.Sc., Ph.D., research assistant, Department of Biochemistry, the Lister Institute of Preventive Medicine, London, to work at Ohio State University, Columbus, Ohio, under Professor M. L. Wolfrom on problems in connection with the human blood group substances; CHARLES G. JAMES, B.A., Ph.D., research student in Department of Physical Chemistry, Cambridge, to work in the University of California, Berkeley, under Professor Leo Brewer, in the general field of high temperature thermochemistry and flame equilibria; and IAN M. MILLS, B.Sc., D.Phil., research student in Department of Chemistry, Oxford, to carry out research in infra-red spectra at the University of Minnesota, under Professor Bryce Crawford, Jr. This brings to 16 the number of awards to candidates from the United Kingdom in a programme which was instituted in 1953 and is intended to enable some 150 outstanding young scientists from the 14 Western European countries to carry out advanced study for up to two years at American universities and research institutions. The programme has now been extended for Britain by the provision of 35 more fellowships which will be tenable up to 30 June, 1957. The US Government has allocated $1,300,000, plus the equivalent of an additional $210,000 in local currencies, for the programme. A grant at a yearly rate of about $3,3000 (approximately £1,180) plus travel expenses will be given each trainee, who must sign a written statement that he promises to return to his country to apply his training. Other requirements for a fellowship include possession of a doctorate in science from a recognised institution of higher education or equivalent experience.

To Open Manchester Office

BAIRD & Tatlock (London) Ltd. will open new offices and showrooms on 10 January at 58 Lever Street, Manchester. Tel.: Central 0937/8. This is the first showroom covering a complete range of scientific instruments, apparatus, laboratory fittings and chemicals to be opened in Manchester, the firm claims. Apparatus, instruments and chemicals from Baird & Tatlock (London) Ltd. and its subsidiary companies, Hopkin & Williams Ltd. and W. B. Nicolson Ltd. will be on view.

A complete range of major instruments and representative stocks of apparatus, laboratory furnishings and spare parts, together with Hopkin & Williams fine chemicals, will be immediately available from the Manchester showrooms. In cases where items cannot be supplied immediately, a frequent delivery service between London and Manchester will enable deliveries to be effected with the minimum delay. The new offices will be able to deal directly with orders from laboratories in the North of England, and in general provide many of the facilities previously only available in London.

Record Nickel Output

A record nickel production of 390,000,000 lb. in the free world during 1954 was forecast by Dr. J. F. Thompson, chairman of International Nickel Company of Canada, just before Christmas. This is 50,000,000 lb. higher than the figure for 1953. Dr. Thompson added that in 1955 production in the free world should reach about 415,000,000 lb.

Lithium : Production & Uses

Now an Element of Growing International Importance

LITHIUM was discovered in 1817 by a young Swedish chemist, Johan August Arfwedson, who had been asked by Berzelius to make a complete analysis of petalite, a new mineral which had been discovered on the island of Utö, near Stockholm. Repeated analyses having failed to give the correct weight balance, Arfwedson deduced that the alkali present in petalite could be neither sodium nor potassium and must therefore be another element.

Not until 1855 did Bunsen and Matthiesen succeed in separating any appreciable quantities of lithium (although Sir Humphry Davy is believed to have isolated small amounts) and many more years elapsed before the metal and its compounds became industrially important. Today, their unique chemical and physical properties are being utilised in many industries to produce results which would otherwise be unobtainable.

Lithium compounds were used during the second world war in emergency hydrogen generators and also in rescue and signal work. Lithium hydride plays an important part in atomic energy programmes and is stated to be a key material for making the hydrogen bomb. Lithium has thus become an element of great strategic value and a further expansion in consumption is expected.

Increase in Demand

Before the first world war the total demand for lithium in the US amounted to some 200 short tons (as equivalent of lithium carbonate). During the second world war it reached 1,000-1,500 tons, but declined very sharply in the immediate post-war years. The ground lost has now been more than recovered and the potential world consumption is estimated at some 10,000 tons a year. In the US the National Production Authority alone has asked for an annual output of 5,000 tons of lithium carbonate by 1955.

Lithium occurs in many minerals (mostly silicates or phosphates), but few minerals have a high enough lithium content to be commercially important. At present the principal sources of lithium are lepidolite, amblygonite, and spodumene. Lepidolite, also known as lithia mica, is a complex hydrated silicate of aluminium, potassium and lithium carrying fluorine and other elements, and has a lithia content ranging from 2 to 6 per cent. Amblygonite is a complex phosphate of aluminium and lithium, containing fluorine, which has a lithia content of 8-10 per cent. Spodumene, or lithium jade, is a complex silicate of aluminium and lithium often containing sodium, iron, manganese and calcium. Its lithia content varies from 4 to 8 per cent.

Petalite is an aluminium-lithium silicate with a foliaceous structure and a lithia content of 2 to 5 per cent. Zinnwaldite resembles lepidolite in appearance, but is a mica containing about 10 per cent of ferrous oxide and 3 to 4 per cent of lithia. Other lithium bearing minerals of less frequent occurrence include triphylite and lithiophylite, which are phosphates of lithium, manganese and iron.

Found in Certain Waters

Lithium is also a minor constituent of many muscovite-granites and has been found in very small amounts in certain waters. A number of mine waters, especially some in the Redruth district of Cornwall, have been found to carry lithium compounds.

More than half the world's supplies of lithium minerals in recent years has come from the US, whose production of lithium minerals and compounds has been expanded from 2,737 long tons in 1946 to 13,938 tons in 1952. Far from being self-sufficient, however, the US is unable to keep pace with its own expanding needs and is also the world's largest importer. At present the only other producers of importance are South-West Africa and Southern Rhodesia, both of which have very large reserves of the principal lithium minerals.

The most important occurrences in South-West Africa are those situated near the town of Karibib. The comparative freedom of the ores from iron and other undesirable constituents is said to be largely responsible for the extended use of lithium in the glass and ceramic industries. Individual deposits are 6 to 20 miles from rail

and Karibib is 134 miles by rail from the port of Walvis Bay. Mining and treatment costs are low, while road transport over the comparatively short distances involved is by no means prohibitive.

Last year South-West Africa produced 338 short tons of amblygonite (6-8 per cent Li_2O), 8,443 tons of lepidolite (3-3.6 per cent Li_2O) and 1,598 tons of petalite (3-4 per cent Li_2O). There was also a small production of spodumene from Namaqualand in the Union of South Africa.

Increased Output in Rhodesia

There has recently been a notable increase in the production of lithium minerals in Southern Rhodesia. Last year exports from this territory were valued at £150,000. They comprised 336 tons of amblygonite, 11,580 tons of petalite, and 7,682 tons of lepidolite.

This expansion of production in Rhodesia is due mainly to the progress of Bikita Minerals (Private) Ltd., which exercised an option last year over large deposits of lithium-beryllium ores. This company is under the technical management of the Selection Trust, who hold a 50 per cent interest in the venture. It was reported recently that a new company, called American Lithium Chemicals, is being formed in the US, which will be controlled to 50.1 per cent by the American Potash & Chemical Corporation, and the balance by Bikita Minerals. Lithium chemicals will be manufactured at San Antonio, Texas, the lithium ores for this plant being supplied by Bikita.

Another important source of ore is being developed in North Western Quebec.

The specifications upon which lithium ore is purchased depend largely on the purpose for which the mineral is to be used. The chief use for these ores is for the preparation of lithium carbonate, which is the starting point for the manufacture of a wide range of useful salts.

Amblygonite and spodumene are favoured by chemical manufacturers because of their relatively high lithium content. Lithium is often extracted from spodumene by roasting the finely-ground mineral with potassium sulphate at 750-950° C, crude lithium sulphate then being extracted by leaching. Both spodumene and amblygonite may also be treated by a process developed in the United States, in which the powdered material is mixed with excess gypsum and calcined at a temperature between 700 and 1,000° C. The calcine is extracted with water and the lithium is precipitated as carbonate. Alternatively, amblygonite may be heated with a mixture of sulphuric acid and aluminium sulphate at 750-800° C for five hours, followed by cooling, grinding, and extraction with water. Enough sodium carbonate is added to the aqueous extract to precipitate the alumina and phosphate. After filtration the solution is concentrated to about 10-12° Bé. On further evaporation lithium carbonate is precipitated and can be separated for purification.

Lithium, the lightest metal known, has an atomic weight of 6.94, a specific gravity of 0.543, and a melting point of 180° C. In its chemical and physical properties it resembles the metals of the alkalis and alkaline earths. In common with sodium and potassium it decomposes water at ordinary temperatures, forming the hydroxide. In hydrogen, at a red heat, it yields the hydride (LiH). Lithium takes up other elements very readily and in a molten condition is able to remove carbon, sulphur, phosphorus or occluded gases from alloys and metals.

The first major industrial use of lithium salts was in alkaline storage batteries. The active materials in the electrodes are iron, iron oxide, and oxides of nickel. The electrolyte is an aqueous solution of potassium hydroxide in which lithium is present in the form of lithium hydroxide. This compound permits greater utilisation of the active materials in the higher nickel oxide electrode, resulting in greater capacity and longer life.

Lubricating Greases

Nowadays one of the largest and most important uses is in lubricating greases. This application is based on the water insolubility, high melting point, gel-forming characteristics, and lubricity of lithium soaps of fatty acids. Lubricating greases are basically lubricating oils whose thixotropic characteristics are altered by the addition of metallic soaps. When the metallic soap used is a lithium soap, the grease has a high melting point, is soft enough to flow and lubricate at temperatures well below zero, does not emulsify with water, and has a minimum change in consistency with change in temperature.

This combination of properties—obtainable with no other soap or combination of

soaps—has enabled grease manufacturers to produce multi-purpose products. The usual working range is about −20° to 350° F, but certain specially compounded greases of this type have a range of −90° to 400° F.

Because of their unusual lubricating properties, lithium soaps are also used in powder metallurgy. Mixed with the powdered metal before pressing, the soap acts as an internal lubricant and as a die lubricant, resulting in denser compacts with low mould release pressure and low die wear. Since all such compacts are subjected to sintering, the lithium stearate, after serving its purpose, is completely volatilised and does not leave any abrasive oxide residue in or on the finished product.

The lubricating property of lithium stearate is also used in the fabrication of vinyl plastics, particularly in calendering. The high melting point of this compound allows the fabricator to use higher calendering temperatures without the plastic sticking to the calender roll.

Hygroscopic Materials

Both lithium chloride and lithium bromide are extremely hygroscopic, have excellent solubility at very low temperatures, are thermally stable, and maintain a constant relative humidity in gases that come into contact with them. This combination of properties renders them extremely useful in air conditioning systems. Because of the solubility and stability characteristics of lithium chloride, a 35 per cent solution can be circulated at temperatures as low as −70° C, while the moisture is readily removed from these solutions without decomposition by heating to 120° C.

Lithium solutions are also used in industrial drying systems where a constant relative humidity is desired. Typical applications are in the processing of synthetic and natural fibres, where a relatively high degree of humidity must be maintained; in fine chemical and pharmaceutical manufacturing where a low relative humidity may be desirable; and in situations where dimensional instability due to moisture absorption cannot be tolerated.

Both the bromide and the chloride can be used to meet extremes of operating conditions. If an extremely dry air is desirable, lithium chloride brine can be used both to maintain a low relative humidity and also to act as the heat transfer medium to keep the drying air cool. At the other extreme, when drying some materials such as soaps, case hardening will result unless a high relative humidity is maintained.

Lithium Salts in Refrigeration

The bromide, chloride and nitrate have a high absorption value for many refrigerating gases, including ammonia, methylamine, and a number of chlorinated organic materials. Solutions of these salts are therefore used in cooling systems to absorb the refrigerant, which is then regenerated by heating.

Another important development is the use of lithium to control the reactions leading to the formation of alkyd resins for use in paints. A small quantity of lithium leads to rapid esterification to the most desirable form for paint. Lithium is usually added as the hydroxide or carbonate and produces haze-free resins.

The solubility characteristics of lithium have been used in dyeing. The lithium salts of alizarin and anthraquinone type dyes possess greater solubility than the corresponding sodium or potassium salts, thus allowing more intense colours to be obtained in the dye bath.

Low-melting eutectic mixtures of lithium salts are used in salt baths for metal treatment or heat transfer purposes. For example, mixtures of lithium nitrate with the nitrates of potassium, sodium or calcium, yield baths with melting points as low as 119° C.

Welding and soldering fluxes containing lithium fluoride and chloride became popular during the war. Their essential features are low melting point, high boiling point, favourable surface tension characteristics, and, of primary importance, good deoxidising properties. Multi-component systems containing lithium halides meet all the requirements for welding aluminium.

The ceramics industry uses lithium primarily as a flux in order to obtain lower softening and maturing temperatures. There are instances in which its crystal-orientation ability is used to produce greater thermal stability in some types of glasses and bodies. On the other hand, it is also used in porcelain enamels for imparting high thermal expansion to match the expansion of the base metals on which such enamels are used.

Both lepidolite and spodumene are being increasingly used in the manufacture of glass, particularly in the US. It has been

claimed that some lithia-containing glass has the lowest melting point and the lowest annealing temperature of all alkali glasses, and that the presence of lithium reduces the coefficient of expansion. The largest application in the glass industry is probably for the production of heat-resisting boro-silicate glass.

Metallic lithium is being increasingly used in metallurgy, both as an alloying element and as a scavenger. As an alloying element, it may be added to metals of higher melting point—e.g., aluminium, magnesium, lead or zinc—to improve certain physical properties such as hardness, toughness and tensile strength. In the iron and steel industry lithium is used in making nodular iron, for grain refinement in steels, and in the desulphurisation of steel. In the non-ferrous metals field, it is used in the production of high-conductivity copper castings; also in chrome bronzes, nickel silver, Monel and precious metal castings. The petroleum industry uses lithium both as a catalyst and for desulphurisation.

Continuing research on lithium and its compounds holds promise of a still wider field of application in the years to come. It may well be that prospecting and exploration, stimulated by the ever-growing demand, will lead to the discovery or development of new sources of supply. At the present time, however, the Commonwealth and Western Europe are almost entirely dependent on Southern Africa for supplies of lithium ore. Fortunately the known resources of South-West Africa and Southern Rhodesia are large enough to supply an expanding demand for many years.

More Contact Acid

Olin Develop Cominco Process

SUBSTANTIAL increases in capacity from existing contact sulphuric acid plants are possible with a 2-stage exit gas scrubbing process now being offered for licensing to other manufacturers by Olin Mathieson Chemical Corporation. Increases as high as 20 per cent have been demonstrated, and greater increases are possible.

Olin Mathieson has exclusive licensing rights in the United States to the process, developed originally by the Consolidated Mining and Smelting Company of Canada Ltd., and known as the Cominco SO_2 recovery process. A modification was developed by Olin Mathieson for its own use.

Olin Mathieson has established a Western Sulphur & Acids Division at Little Rock, Arkansas, which will offer engineering consulting service or will undertake design, installation and initial operation of the process under contract to licensees.

Even at the most efficient rates of operation contact sulphuric acid plants normally sustain some economic loss in the sulphur which is discharged into the air in exit gases as sulphur dioxide and sulphur trioxide. The Cominco 2-stage scrubber returns this sulphur to the production unit. In addition, plants equipped with the Cominco system can be operated at rates well in excess of normal capacity. These higher production rates are practical, even though conversion of the sulphur to sulphuric acid is less efficient, because substantially all the unconverted sulphur is recovered and reprocessed.

The first system utilising the Cominco process in the US was put into operation more than a year ago by Olin Mathieson at its Pasadena, Texa, plant. There the 2-stage scrubber, using ammonium sulphite-bisulphite scrubbing solution, returns sulphur to the production unit and converts part of the acidic values in the exit gases to ammonium sulphate.

Exhibition for Provinces

FOLLOWING the success of their exhibition 'Epikote Resins and their Uses' in London, which was visited by nearly 2,000 guests, Shell Chemicals Ltd. are taking it to the Provinces.

It will be open at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham 2, on 11, 12 and 13 January; at the Central Hotel, Glasgow, on 25 and 26 January and in the Bleachers' Association Assembly Hall, Blackfriars House, Parsonage, Manchester, on 2 and 3 February.

Invitations to these exhibitions, which are of interest to all concerned with surface coatings and plastics, can be obtained from the Divisional Offices of Shell Chemicals Ltd. at Clarence Chambers, 39 Corporation Street, Birmingham 2; 28 St. Enoch Square, Glasgow C.1, and 42 Deansgate, Manchester 3.

Stainless Steel Filters

New Developments With Marked Advantages

DEVELOPMENT and use of stainless steel filters has been reviewed by B. Sugarman and G. Collins, of the BSA Group Research Centre, Sheffield, as part of a paper on porous stainless steel contributed jointly by six British scientists and technologists to a Symposium on Powder Metallurgy, recently organised by the Iron and Steel Institute in association with the Institute of Metals.

About eight years ago it was realised in Great Britain that no commercial source of stainless steel powder was available. Following an approach by Dr. H. Sutton, C.B.E., Ministry of Supply (Air), a preliminary study was undertaken by different parts of the BSA Group, firstly into the production of stainless steel powder and secondly into the powder-metallurgical problems involved in the production of discs and sheets of uniform permeability. Once a stainless-steel graded powder had been repeatedly manufactured and proved reproducible, the way was open for subsequent powder-metallurgical developments. This was undertaken by Metal and Plastic Compacts Ltd., Birmingham.

When it had been established that reasonably strong discs and rectangular sheets of porous stainless steel could be produced, the prospect of building these into filter units for use at high temperatures immediately became apparent.

Advantages over Alternatives

Porous stainless steel as a filtering medium possesses certain advantages over normal filtering alternatives. These are summarised as:

High mechanical and thermal shock resistance.

High resistance to chemical attack.

High maximum operating temperatures (about 500° C).

Ease of cleaning by back-washing.

Higher flow rates per unit area than for the majority of other sintered products of similar pore size.

The chemical corrosion resistance of porous 18/8 austenitic stainless-steel filters is still being investigated, but Sugarman and Collins consider it safe to assume that porous stainless-steel filters can be used successfully with substances which do not attack solid stainless steel. Chemicals which attack solid stainless steel, however, will be expected to attack porous materials to a greater extent, owing to the greater surface area presented and the different degree of passivation.

Possible Applications

As examples of possible applications the authors list, under the general heading of laboratory aids, filters of many descriptions, in the form of Buchner funnels, beaker filters, filter crucibles, and aerators.

Filter assembly by normal welding techniques proved difficult. Cracking occurred, owing to the lower mechanical strength of the porous plate compared with the solid stainless-steel components and to the increased oxidation produced in the porous material because of the increased surface area. A method of joining porous stainless steel by metal spraying has been developed and is termed 'cold welding' because of the low temperature at which the joint is made by progressive build-up. It has proved very successful for the coarser types of filter, but for the finer grades argon-arc welding is usually employed.

When filters are required for use at high operating temperatures, some reinforcement is always desirable.

Finished assembled filters are always finally pickled in 16 per cent nitric acid solution, which cleans the filter and passivates the stainless steel. They are finally subjected to various tests to ensure satisfactory operation in service. Assembled filters can have their maximum and average pore sizes determined according to the general methods laid down in BS. 1752:1953 and BS. 1969:1953. However, porous stainless-steel filters are graded normally by the average permeability of the plate rather than by pore size, and they are all tested before use. Most filters are tested with water as the test fluid while those filters of surface area greater than 0.25 sq. ft. are usually checked by air-flow methods.

Gas Evolution from Liquids

Paper at Institution of Chemical Engineers Meeting

A MEETING of the Institution of Chemical Engineers, North-Western Branch, was held at Manchester on 11 December, when G. Burrows and F. H. Preece presented a paper, 'The Process of Gas Evolution from Low Vapour Pressure Liquids upon Reduction of Pressure.' Mr. Burrows read the paper and gave explanatory notes on it.

Restricted Term

The term 'gas' was restricted by Mr. Burrows to a permanent, non-condensable gas and 'vapour' to a condensable vapour. When a liquid is subjected to a considerable reduction in pressure, it may be necessary to estimate the rate at which gas will be evolved during the period of reduction and to estimate the rate at which the apparatus may be evacuated without causing the liquid to splash or to froth by excessive rates of bubbling. In the absence of bubbling, gas will reach and leave the surface of a super-saturated liquid by diffusion through the liquid. If the super-saturation is increased, bubbling occurs and the rate of gas evolution increases; the evolution is dependent on the initial saturation pressure, the solubility of the gas in the liquid and the diffusivity.

This type of bubbling differs from bubbling as a result of boiling and the bubbles from a liquid with a very low vapour pressure will consist of gas only. Considerable super-saturation is attained before bubbles are evolved from the liquid. The authors derived equations to correlate the properties of gases in liquids during gas evolution by diffusion and described an experimental apparatus for their investigation.

The theory of nucleation indicates that a much greater degree of superheat is necessary to form bubbles in liquids than is required in practice. The application of the theory is difficult because gas bubbles are formed by a reduction in pressure and because there are relatively few of them in the liquid. Experiments were made to establish the degree of super-saturation necessary to form bubbles under different conditions when the liquid was agitated only by bubble formation.

Bubbles are likely to be formed in a liquid contained in a vessel, by the existence of gas in cavities in the surface of the vessel that are submerged by the liquid which is incapable of completely wetting the whole surface; upon reduction in pressure, gas would pass from the liquid into the gas in the cavities and would expand into a bubble. This bubble is detached from the vessel surface when the bubble has grown larger. The increase in agitation and in turbulence in the liquid caused by the bubbles will give an increase in the rate of evolution of the gas. Bubble initiation was found experimentally to depend more on the ratio of high to low pressure than on the difference between the pressures imposed on the liquid. Gas evolution during bubbling was not readily amenable to theoretical treatment but empirical equations were found to express the rate of gas evolution for given pressure ratios. The variation in size of the bubbles during their ascent through the liquid was related to their velocity.

Progress Due to Engineers

CHEMICAL engineering takes first place in modern industrial life and without the chemical engineer it would have been impossible to obtain the progress achieved to date, Mr. P. A. Salbaing, manager of the engineering and construction division of the Canadian Liquid Air Co. Ltd., said at a meeting of the French-speaking members of the Montreal branch of the Engineering Institute of Canada. Mr. Sailbaing added there could be no better example of the achievements of chemical engineers than the Atomic Energy Commission plant at Oak Ridge, Tenn., where scientists separate isotopes from uranium.

'To illustrate the high standing of chemical engineering in modern economic life it is sufficient to show that chemical and petroleum industries in the United States in 1952 spent more than $3,000,000,000 in construction and passed $4,000,000,000 in 1953,' he went on.

Mr. Sailbaing said the chemical industry had advanced much more rapidly since the introduction of chemical engineering about the turn of the century.

Indian Newsletter

FROM OUR OWN CORRESPONDENT

TWO new soda ash factories are to be set up at Porbander in Saurashtra and Tuticorin in South India according to the Deputy Minister for Industry of the Government of India. A third plant may also be set up probably in Bihar. The chairman of the Tata Chemicals Ltd., Mithapur, stated at the company's recent annual meeting that the production of soda ash has increased threefold in the last five years. The productive capacity of the industry would be in the neighbourhood of 30,000 tons of soda ash per annum as against the present demand of about 115,000 tons, the gap being met through imports. In connection with the setting up of new chemical plants, it may be pointed out that the Government of Madras State have formulated plans for the setting up of a DDT factory at Mettur where there is a thriving alkali-chlorine industry, a soda ash plant, an aluminium plant to utilise the Shevaroy bauxite deposits near Salem (Madras), a steel plant and plants for the processing and utilisation of lignite of Neiveli. Other State Government schemes relate to the expansion of the iron and steel works at Bhadravati, establishment of ferromanganese, fertiliser and raw film industries in Mysore, setting up of a sulphuric acid plant to utilise the smelter gases from the lead-zinc industry at Zawar and fertiliser plants, one in the same area of Rajasthan and another in Hyderabad. These proposals have just been communicated to the Government of India by the States and await consideration.

* * *

The Government of India, on the basis of the industrial policy resolution of 1948, have declined the issue of licences to the private sector for the starting of pig iron and steel projects in the country. Strong criticism has been entered against the policy of not allowing private enterprise to function effectively in a mixed economy. A ten-man team of Russian steel experts has arrived in India, as a sequel to a Russian offer to set up a steel plant in India (THE CHEMICAL AGE, 1954, **70**, 887). The Russians have had discussions in the Indian capital with ministers and officials. It is learnt that they are settling the details of the categories of steel and the quantities to be produced by the proposed factory, and will proceed to Moscow to examine the proposition in fuller detail. Meanwhile work in connection with the setting up of the steel plant at Roerkela with German collaboration is proceeding according to plan.

* * *

At the fourteenth annual meeting of the Indian Chemical Manufacturers' Association, the president stated that the bulk of the investment in the important chemical and pharmaceutical industries lay in the public sector and pointed out that good progress was registered in the field of inorganic chemicals. An up-to-date survey of the Indian chemical industries has just been completed by the Association.

Burma Firm's Progress

EVANS Medical Supplies Ltd. announce that despite the monsoon satisfactory progress has been made in preparing the 140-acre site for the Burma Pharmaceutical Industry buildings. Most of the service roads are completed and the foundations for the main pharmaceutical buildings are well under way.

The temporary production unit, which is to be in operation by mid-1955, is about to be erected. Detailed plans have been completed for all the remaining buildings, and the main contractors have started work with a view to completing the walls and roof before the 1955 monsoon. More than £250,000 worth of plant, machinery and equipment have been ordered.

The following are some of the principal appointments which have been made, in addition to Mr. R. W. Oxtoby, who, as previously announced, is the general manager: production control manager, Mr. L. V. C. Griffiths, B.Sc., F.R.I.C., quality control chemist, Mr. G. Tunstall, A.R.I.C.

Mr. Tunstall is seconded from Evans Medical staff. In addition, a number of Burmans are training in the company's establishments with a view to taking up positions in due course.

Additions to KID

THE Board of Trade have made the Safeguarding of Industries (List of Dutiable Goods) (Amendment No. 7) Order, 1954, adding the following 58 chemicals to the list of chemicals liable to Key Industry Duty:—

Ammonium di-(2-hydroxyethyl) aminoacetate; diammonium 2-hydroxyethylaminediacetate.

2-isoButylaminoethanol; 2-*n*-butylaminoethanol; 6-*tert*-butyl-2:4-xylenol.

Calcium disodium ethylenediaminetetraacetate; N-2-chloroethylmorpholine; N-2-chloroethylmorpholine hydrochloride.

N,N′-Dibenzylethylenediamine; N,N′-dibenzylethylenediamine diacetate; N,N′-dibenzylethylene diamine di-*n*-butyrate; N,N′-dibenzylethylenediamine diisobutyrate; N,N′-dibenzylethylene diamine dihydrochloride; N,N′-dibenzylethylenediamine dipropionate; N,N′-dibenzylethylenediamine phosphate; N,N′-dibenzylethylenediamine sulphate; 2-diisobutylaminoethanol; 2-di-*n*-butylaminoethanol; N,N′-di*sec.*-butyl-*p*-phenylenediamine; di(diethanolammonium)2-hydroxyethylaminediacetate; diethanolammonium di-(2-hydroxyethyl)aminoacetate; di(monoethanolammonium)2-hydroxyethylamine diacetate; 2:5-diethoxytetrahydrofuran; di-(2-hydroxyethyl)aminoacetic acid; 2-diisopropylaminoethanol.

Monoethanolammonium di-(2-hydroxyethyl)aminoacetate; ethylenediaminetetraacetic salts, the following: di(diethanolammonium) ethylenediaminetetra-acetate; mono(diethanolammonium) ethylenediaminetetraacetate; di(monoethanolammonium) ethylenediaminetetra-acetate; mono(ethanolammonium) ethylene diaminetetra-acetate; tetra(diethanolammonium) ethylenediaminetetraacetate;tetra(monoethanolammonium) ethylenediaminetetra-acetate; tri(diethanolammoenediaminetetra-acetate; tri(diethanolammoethanolammonium) ethylenediaminetetraacetate.

5-Ethylhexahydro-5-phenylpyrimidine-4:6-dione.

Germanium tetrachloride; germanium disulphide.

N-2-Hydroxyethylmorpholine; N-2-hydroxyethylmorpholine hydrochloride; 2-hydroxyethylaminediacetic acid.

Magnesium germanate; 2-(4-morpholinylmercapto)benzothiazole.

4-Nitroacetophenone.

Pentane-1:5 - di - (1 - methylpyrrolidinium hydrogen tartrate); potassium di-(2-hydroxyethyl)aminoacetate; dipotassium 2-hydroxyethylaminediacetate; primaquine diphosphate; 2-isopropylaminoethanol.

Quinapyramine chloride; quinapyramine sulphate.

Sodium di-(2-hydroxyethyl)aminoacetate; disodium 2-hydroxyethylaminediacetate; suramin.

2:2:6:6-Tetra(hydroxymethyl) cyclohexanol; tetronic acid; trichloromethanesulphenyl chloride; tropinone.

Vitamin D_3 crystalline.

The order, which came into operation on 20 December, is published as Statutory Instruments 1954, No. 1648. Copies may be obtained (price 2d. net, by post 3½d.) direct from HM Stationery Office, Kingsway, London W.C.2, and branches, or through any bookseller.

Chemicals at the BIF

THE chemical industry has decided to associate itself once more with the British Industries Fair in London. The decision to do so was taken at a recent meeting of the Council of the Association of British Chemical Manufacturers.

At the 1955 British Industries Fair a single exhibit will be staged representing the chemical industry. This will be followed in 1956 by full scale participation in which individual companies will take part in a co-ordinated display of major importance.

The 1955 stand will occupy an area of 1,600 sq. ft. on an island site in the main gangway of the Grand Hall, Olympia. Designed by Mr. John Lansdell, F.R.S.A., M.S.I.A., it will take, as its theme, the part played by the chemical industry in the life of the nation both at home and, by reason of its exports, overseas.

There will be an additional feature of special importance—a model of the comprehensive chemical section which it is intended to stage with the support of companies representing all branches of the industry at the British Industries Fair in 1956.

The 1955 exhibit is, therefore, in the nature of a 'holding operation' intended to support British Industries Fair Ltd. in its initial venture and enable the industry to prepare itself for a publicity effort of major size in 1956.

The Export Situation

A Further Disappointing Decline in Business

EXPORTS of chemicals during November showed the decline common to the export trade as a whole, a decline caused largely by the prolongation of the London dock strike. The total of £14,360,856 compared with the October figure of £16,815,325, which was itself a disappointing amount and considerably less than the September total. In fact, exports for November were the lowest since February, which is the shortest month.

The fall was shared by nearly all products except fertilisers, which showed a welcome increase, probably a seasonal one. One or two chemicals, such as the lead and magnesium compounds, increased slightly, and so did ethyl, methyl, etc., alcohols. Lead tetra-ethyl declined sharply after reaching a record level in October.

On the whole, exports to the less distant countries in Europe maintained their level or even, in some cases, increased it, the largest falls being in business with American, African and Asiatic countries. An exception was the welcome increase in exports to Canada. Spain, too, became a fairly important customer, but the Netherlands Antilles, whose imports of chemicals from Britain reached dramatic heights in October, reverted to normality.

TABLE 1

VALUE OF EXPORTS IN £ : PRINCIPAL CUSTOMERS

	Nov. 1954	Oct. 1954	Nov. 1953
Gold Coast	189,913	343,197	259,192
Nigeria	233,487	306,543	394,186
South Africa	555,496	713,623	727,829
India	976,288	1,251,147	1,388,808
Pakistan	234,535	338,940	367,961
Singapore	231,275	216,949	258,995
Malaya	163,400	242,710	207,235
Ceylon	237,983	266,397	298,730
Hong Kong	208,587	308,427	332,106
Australia	865,240	1,413,347	1,120,511
New Zealand	388,621	568,777	440,972
Canada	846,774	532,866	896,252
Eire	542,359	536,784	521,642
Finland	126,414	306,496	154,939
Sweden	505,775	566,507	446,656
Norway	265,813	207,896	328,116
Denmark	339,945	352,130	365,011
Western Germany	493,463	309,178	207,197
Netherlands	701,767	546,859	538,092
Belgium	418,896	290,950	490,790
France	517,166	537,417	468,772
Switzerland	227,455	178,117	192,208
Portugal	106,324	220,812	195,838
Spain	183,645	74,873	69,724
Italy	445,227	321,935	287,058
Netherlands Antilles	17,237	537,033	35,977
Egypt	163,907	185,429	243,041
Burma	179,829	149,290	277,128
US	401,005	582,722	524,157
Argentina	520,940	761,088	447,180
Total value of chemical exports	**14,360,856**	**16,815,325**	**16,420,593**

TABLE 2

VALUE OF EXPORTS IN £ : PRINCIPAL COMMODITIES

	Nov. 1954	Oct. 1954	Nov. 1953
Acids, inorganic	42,371	44,638	46,438
Copper sulphate	132,005	106,876	207,995
Sodium hydroxide	199,569	447,864	338,233
Sodium carbonate	137,776	267,958	280,749
Aluminium oxide, anhydrous	167	10,418	185
Aluminium sulphate	30,062	56,249	34,570
Ammonia	18,171	36,174	25,105
Ammonium chloride	24,263	41,313	51,957
Bismuth compounds	20,127	31,347	39,839
Bleaching powder	35,440	30,710	41,209
Hydrosulphite	47,063	72,050	59,014
Calcium compounds, inorganic	39,262	45,574	74,171
Lead compounds, inorganic	38,999	31,864	44,437
Magnesium compounds	49,852	46,719	49,862
Nickel salts	47,526	83,629	53,813
Ethyl, methyl, etc., alcohols	125,541	96,428	182,700
Acetone	40,731	34,228	80,156
Lead tetra-ethyl	508,789	1,048,566	259,053
Total for chemical elements and compounds	**3,738,297**	**5,171,023**	**4,501,632**
Coal tar	92,162	124,443	53,419
Cresylic acid	31,843	65,611	55,469
Benzole	330	130	101,508
Creosote oil	69,461	105,294	111,705
Total from coal tar, etc.	**213,127**	**354,629**	**337,031**
Indigo, synthetic	35,238	92,380	114,587
Total from synthetic dyestuffs	**586,644**	**751,123**	**1,127,096**
Medicinal and pharmaceutical products, total	**2,365,990**	**2,753,312**	**2,797,510**
Essential oils :			
Natural	33,745	33,198	21,772
Synthetic	50,017	61,819	60,291
Flavouring essences, etc.	74,293	62,291	76,554
Total for essential oils, perfumes, etc.	**1,459,682**	**1,476,939**	**1,789,215**
Ammonium nitrate	18,620	13,904	121,105
Ammonium sulphate	833,903	714,694	566,948
Total for all fertilisers	**892,071**	**752,563**	**749,091**
Paints, pigments and tannins, total	**1,288,158**	**1,346,727**	**1,658,592**
Plastics materials, total	**1,773,559**	**2,015,277**	**1,814,720**

Anti-Trust Suit Fails

Du Pont Case Dismissed After Five Years

THE suit of the US Government, alleging conspiracy to violate the anti-trust laws by E.I. Du Pont de Nemours & Company, General Motors Corporation, United States Rubber Corporation *et al.* was dismissed in Chicago on 3 December by Judge Walter J. LaBuy, US district Judge for the Northern District of Illinois. The suit was under litigation in Judge LaBuy's court for about five years.

The Anti-Trust Division of the Department of Justice filed its complaint on 30 June 1949, naming the Du Pont Company, General Motors Corporation, United States Rubber Company, Christiana Securities Company, Delaware Realty and Investment Company, and more than 100 individual members of the Du Pont family as defendants. The Government charged that stock ownership had been used to obtain and perpetuate common control of Du Pont, General Motors, and US Rubber, with the effect of dividing fields of activity among the companies, requiring the companies to purchase goods from one another, and suppressing competition. All defendants denied the charges.

Three Years Later

The case came to trial on 18 November, 1952. During the trial the number of individual defendants was reduced to seven charged with participation in unlawful conspiracy and 26 others retained as 'beneficiary defendants' because of their interest in trusts which hold US Rubber stock. Presentation of evidence was completed on 29 June 1953, after 91 court days, and final briefs were filed on 26 February 1954.

Du Pont's defence was based fundamentally on the contention that each of the three manufacturing corporations purchased from the others only such products, and in only such quantities, as each considered appropriate to the efficient conduct of its own business; that the full history of dealings among the three corporations disclosed neither restraint of trade nor monopolisation, but free and open competition.

In his opinion dismissing the suit, Judge LaBuy said that the Government had failed to prove conspiracy, monopolisation, a restraint of trade or any reasonable probability of such a restraint.

New Alkathene Granule

COMMERCIAL quantities of a new form of I.C.I. Alkathene granule—known as 'Caviare Cut'—will be available in a few months time. The new product takes the form of uniform spheroids $\frac{1}{8}$ in. in diameter, formed by cutting extruded laces of polythene while still molten. The method is covered by patent applications.

This new form is more free flowing than other types of granule, has a higher packing density, is entirely free from dust and longs, and the particles melt more regularly. The diameter chosen is that most suitable for use in the fabricator's machinery.

Tests by a number of British firms have shown that owing to its higher bulk density 'Caviare Cut' makes possible slightly higher output from extruders (roughly 5-10 per cent greater than with cube cut materials and considerably greater than with disintegrated material) and enables a mould of greater capacity to be filled in one stroke.

The regularity of the melting rate of each granule leads to a superior surface finish of extruded articles. Regularity of size and shape produces steadier operation of machinery and freedom from blockages or jamming of moving parts. Another advantage is that the granules are cleaner and easier to discharge from the containers.

No More Agene in Flour

THE use of Agene in the treatment of flour is to be discontinued, Mr. Heathcote Amory, Minister of Food, said in a parliamentary written reply on 21 December. Experiments had confirmed that Agene-treated flour, when fed in large quantities, caused fits in dogs, he said, and had also shown that none of the other improvers used—chlorine dioxide, potassium bromate, ascorbic acid and an aeration process—did the same.

Although no ill effects in man due to the use of Agenised flour had been established, effect should not be given to the decision taken in 1950 to discontinue Agene.

Mr. Amory said that further investigations undertaken by the Medical Research Council had revealed some differences between the effects on flour of the other methods of improvement but they were not sufficient for any of them to be discontinued.

Electrical Safety in Hazardous Areas

by A. G. THOMSON

THE principles underlying the safe use of electricity in coal mines have to a large extent been determined and prescribed by statutory regulations (Coal Mines Act, 1911, General Regulations as to the Installation and Use of Electricity: 1924 Edition). In the case of industry, where gases and vapours are both numerous and complex, it has not yet been found practicable to lay down precise regulations.

The statutory requirements governing the installation and use of electrical apparatus in industries to which the Factories Act, 1937, applies are controlled by the Electricity Regulations S R & O, 1908, No. 1312. Regulation 27, while giving no specific rules regarding electrical apparatus for use in situations where explosion hazards exist, stipulates that: 'All conductors and apparatus exposed to the weather, wet, corrosion, inflammable or explosive atmospheres, or used in any process or for any special purpose other than for lighting and power, shall be so constructed or protected, and such special precautions shall be taken, as may be necessary adequately to prevent danger in view of such exposure or use.'

The Act thus places the onus on industry to recognise and assess an explosion hazard and to take all necessary precautions to meet it.

Chemical Hazards

In chemical plants there may be present inflammable gases, vapours, dusts or liquids which, under certain conditions, may constitute explosion hazards, some at ambient temperatures and others only at higher temperatures. Where seepage, leakage or spillage of such materials occurs, admixture with air is unavoidable and may result in a local explosive concentration. The mechanism of ignition is not yet fully understood, but it is known that the electrical energy required to initiate an explosion may be very small—less than a few thousandths of a joule.

For the purpose of selecting suitable apparatus, plants or situations may be divided into four main categories:

Class A—Where no inflammable or explosive substance is processed, handled or stored.

Class B—Where inflammable or explosive substances are processed, handled or stored under such efficiently controlled conditions that their liability to constitute an explosion hazard may be considered unlikely. This classification pre-supposes that efficient means are provided for removing hazardous products of an abnormal occurrence to a point where contact at dangerous concentrations with electrical apparatus is highly improbable.

Class C—Where an inflammable or explosive substance is processed, handled or stored in conditions such that its liability to constitute an explosion hazard cannot be considered unlikely.

Class D—Where an inflammable or explosive substance is continuously present in explosive concentrations.

Temporary Conditions

Under certain shut-down or other special conditions, the explosion hazards normally present in a plant may be absent for a temporary period. If this absence of explosion hazards can be guaranteed by the responsible authority with the issue of a clearance certificate, the area concerned may be considered to be temporarily a Class A risk, in which ordinary industrial types of electrical equipment may be used. Conversely, there may be occasions when the hazard normally present is increased.

The safe utilisation of electricity in connection with hazardous areas calls for the adoption of certain safeguards, which may be listed as follows: Segregation, flameproof apparatus, totally enclosed apparatus, pressurisation, intrinsically safe circuits and apparatus, non-sparking apparatus, and approved apparatus.

An example of segregation (i.e., the exclusion of an electrical apparatus from a particular hazardous area) is the use of a non-sparking motor in a Class B area to drive a pump in a Class C area, the shaft connecting the two machines passing through a gas-tight gland in a wall separating the two areas.

Flameproof apparatus is so designed and constructed as to comply with BS.229:1946, which states that it must 'withstand without injury any explosion of the prescribed in-

Industrial Safety

flammable gas that may occur within it, under practical conditions of operation within the rating of the apparatus (and recognised overloads, if any associated therewith) and will prevent the transmission of flame such as will ignite the prescribed inflammable gas which may be present in the surrounding atmosphere.' Apparatus claiming to be flameproof is tested by the Ministry of Fuel and Power. If found satisfactory, a Certificate of Flameproofness is issued in respect of a prescribed gas or vapour group. Apparatus certified by the Ministry is marked in accordance with BS. 229:1946, Clause 29.

Totally Enclosed Apparatus

Totally enclosed apparatus is variously known as dust-tight, dust-proof, vapour-tight, or gas-tight. These terms describe any enclosure for electrical apparatus which is so constructed that, when sparking or heating takes place internally under normal operation, the risk of a hazard arising, due to its being surrounded for a short period by an inflammable or explosive atmosphere, is very small.

It is not normally practicable to manufacture industrial type motors, switches, lighting fittings and similar apparatus to remain gas-tight and many fittings so described will, in fact, be found to 'breathe' if heated or cooled. If conditions are such, however, that any explosive atmosphere which may occur round a fitting will never be permitted to exist long enough to produce an inflammable or explosive concentration inside the fitting, then the use of such a fitting may be permitted.

A high degree of protection is afforded by pressurisation. In a pressurisation system all electrical apparatus is contained within an enclosure which, together with all piping or ducting connected thereto, is filled, preferably with an inert gas supplied from an external source clear of the hazard, and is maintained at all times at a pressure suitably in excess of that of the hazardous atmosphere, so as to prevent ingress of the latter into the enclosure. Pressurisation with an inert gas incapable of supporting combustion will provide a higher degree of protection than with air.

Pressurisation should be so interlocked that the electrical circuit cannot be made live without the pressure existing, and that on failure of the pressure an alarm is given. In the case of Class C areas, power should be automatically cut off from apparatus of the non-sparking type, where this can be done without introducing further hazards.

As an example of pressurisation may be instanced an AC commutator type variable speed motor in a hazardous area, which is pressure ventilated by means of a fan forcing into the ducting clean dry air drawn from a non-hazardous area. The air circulates through the motor and is exhausted through ducting into a non-hazardous area. Interlocks ensure that the ventilating fan is running before the main motor starts, and that the latter shuts down automatically on failure of power supply to the ventilating fan.

Another application is an instrument panel in a hazardous area, which is totally enclosed and sealed as far as possible. The interior of the panel is pressurised with nitrogen. A pressure-operated relay operates an alarm on failure of the pressure.

The term 'intrinsically safe' is described in BS. 1259:1945 as follows:

(1) Applied to a circuit: denotes that any sparking which may occur therein in normal working and with the prescribed components is incapable of causing an explosion of the prescribed inflammable gas or vapour;

(2) Applied to apparatus: denotes that the apparatus is so constructed that, when connected and used under the prescribed conditions, any sparking that may occur in normal working, either in the apparatus or in the circuit associated therewith, is incapable of causing an explosion of the prescribed inflammable gas or vapour.

Ministry Certificates

The Ministry of Fuel and Power is the responsible authority for the examination and type-testing of all apparatus or circuits claimed to be intrinsically safe. If found satisfactory, a certificate to that effect is issued by the Ministry concerned, which for industry is the Ministry of Labour and National Service (Factory Department). Certificates of intrinsic safety are issued only to cover the use of a particular circuit or apparatus in the particular hazardous atmosphere which is specified.

Non-sparking apparatus is such that under normal operating conditions, except when

subject to electrical or mechanical failure, it will not produce open sparking capable of igniting a surrounding hazardous atmosphere.

Apparatus which is neither flameproof nor intrinsically safe can sometimes be approved and certified by the responsible authority for use in the specified hazardous atmosphere or atmospheres. Since any modification to the apparatus or alterations to the qualitative composition of the hazardous atmosphere may invalidate the certificate, the field of application for 'approved' apparatus in industry is limited.

The safeguards to be adopted in hazardous situations depend not only on the class or risk, but also on the type of equipment and the particular circumstances. As a broad indication, it can be stated that all the safeguards previously listed might be considered for a Class B risk, but neither non-sparking apparatus nor intrinsically safe apparatus would give sufficient protection for a Class C risk. In the case of a Class D risk, segregation of all electrical apparatus is the only effective safeguard.

Corrosive conditions will adversely affect most electrical equipment, and this factor is particularly important where apparatus for hazardous situations is concerned. Flameproof equipment, when required, should be so selected as to give a margin of safety under insidiously corrosive conditions. While the failure of intrinsically safe apparatus applicable to the hazards concerned would not normally give rise to a dangerous situation, its use under corrosive conditions requires careful consideration.

Inquiries to Manufacturers

Users should state in inquiries to manufacturers for flameproof, intrinsically safe, or 'approved' apparatus: all relevant British Standard Specifications; the particular gases, vapours or volatile liquids in which the apparatus is to be used; the maximum ambient temperature; and that evidence will be required of the existence of the appropriate Government certificate.

All installations in hazardous situations must comply with the usual regulations appertaining to installations in non-hazardous areas, and are also subject to certain additional requirements. For example, no modification should be permitted to a certified flameproof, intrinsically safe or approved apparatus which may invalidate its certificate. Uncertified electrical equipment installed outside a building containing an explosion hazard must be not less than 25 ft. from the nearest opening in the building wall where the hazard is Class C, nor less than 50 ft. in the case of a Class D risk. These distances may require to be considerably greater, particularly if the hazard involves vapours that are heavier than air.

It is essential that apparatus used in hazardous areas should be maintained in accordance with the design details accepted by the testing authority. This calls for an electrical engineer with a staff of skilled specialist electricians, who should be entirely responsible for inspection and maintenance.

(Acknowledgment is made to Imperial Chemical Industries Ltd. for the information contained in this article.)

D

Industrial Safety

A YORKSHIRE timber impregnation company can justifiably claim to have helped make possible the country's major exhibitions. They are Hickson's Timber Impregnation Co. (GB) Ltd., of Castleford, whose pyrolith process makes timber flame-resistant.

The fire regulations of most of the big exhibitions make it compulsory for fire-resistant hardboard to be used in the construction of all stands and displays. The Packaging Exhibition at Olympia, London (18-28 January) is no exception, and here pyrolith-treated hardboard will not only be in use by individual exhibitors, but also in the construction of the company's own stand.

Tanalised timber is also demonstrated. The name denotes any solid timber, plywood or hardboard which has been vacuum/pressure impregnated with tanalith preservative and it is extensively used by the packaging industry. Not only is it proof against all forms of fungal decay but it is immune from attack by wood-destroying insects.

Pyrolith contains a percentage of tanalith—and consequently has preservative properties—but the greater part is made up of fire-retardant chemicals. These increase the ignition temperature of the wood and develop inert gases about the timbers' surfaces, which dilute the flammable gases generated and prevent their flaming. The vacuum/pressure method is used for impregnation.

Spectrographic Monitor

Electronic Lung Achieves the Impossible

AS several writers in our series of articles on industrial safety have pointed out, the medical problems created by airborne dusts are of great importance in many industries. Some substances in particular are highly toxic, such as beryllium, which in concentrations as low as 2μg. per cu.m. can give rise to berylliosis. Analysis of samples containing such low concentrations is difficult, for not only must the procedure employed be a very sensitive one, but there should be as short an interval as possible between sampling and result.

A basic design for continuous spectrographic sampling of factory atmospheres, which was produced by Dr. A. H. C. P. Gillieson, has been developed by Winston Electronics Ltd., of Park Road, Hampton Hill, into a robust, portable spectrographic monitor, or 'electronic lung.' American experts had maintained that the development of such an instrument was not possible.

The air to be sampled is drawn through the gap between two copper electrodes between which a spark discharge is passing, in a chamber constructed so that the spark is observed along the axis of flow of the entering air, but in the reverse direction. By this means, window obscuration by the copper oxide particles thrown off by the discharge is prevented.

The emission from the spark is focused on the slit of a small specially-designed Littrow-type monochromator, which has behind its exit slit a multiplier photocell. Through a DC amplifier fitted with provision for 'backing-off' unwanted signals, the photomultiplier operates a circular chart recorder.

The indication is only semi-quantitative, since the response is affected by particle size, but in the calibration comparisons which have been run with filter samples and under factory conditions the monitor figures have been within a factor of 2 at the very low levels in the neighbourhood of the toleration figure. At slightly higher levels the accuracy increases rapidly.

The instrument has been shown to respond to beryllium in the form of oxide, of

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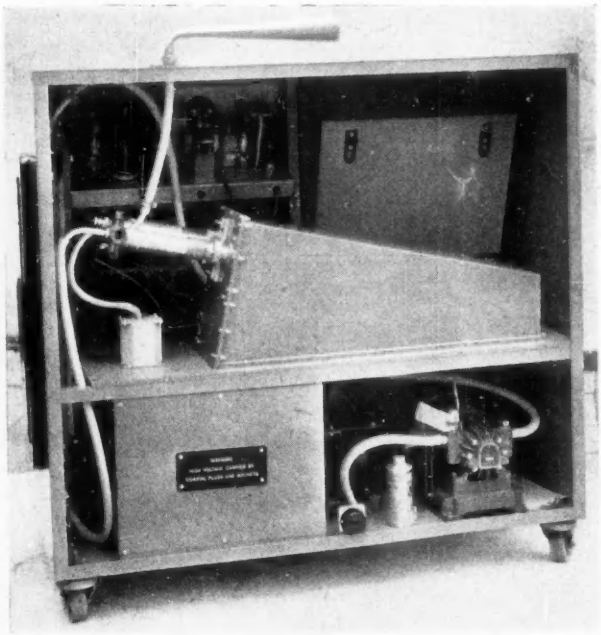

A rear view of the instrument, showing the organisation of the interior. The chassis is 4 ft. by 2 ft., and 3 ft. high. It is mounted on easy-running castors, and can work from mains supplies of 200-250 v. or 100-125 v., at 40-60 c.

Vaporising Liquids & Petrol Fires

by E. H. COLEMAN, F.R.I.C., & G. W. V. STARK, B.Sc., A.R.I.C.

RECENT investigations[1] have shown that chlorobromomethane has a marked superiority over other readily available vaporising liquid extinguishing agents, but preliminary experiments on a scale likely to be encountered in fires in crashed aircraft raised questions as to the optimum rates and method of application in practice. A comparative study has therefore been made of the application of chlorobromomethane using plain jets giving a broken stream, cone sprays, and flat sprays produced either by two impinging jets, or by a jet impinging on a metal plate (fan sprays). A full report of these experiments will be published later, but the principal conclusions are summarised in the present note.

Experiments made on 11-in., 14-in. and 24-in. diameter fires showed that a flat spray applied to the base of the flames was much superior to the other methods of application and that there was a relationship between the area covered by the spray and the area of the fire which could be extinguished. In order to find whether this relationship held on a larger scale, experiments were made on a 4-ft. diameter fire with fan sprays and an applicator using an array of batswing gas burners as nozzles. This produced a thin flat spray covering a much greater area than from the fan spray; further experiments were then made with 10-ft. sq. fires with a larger applicator to ascertain the relationship between the area covered by the spray and the size of the fire. Typical results are given in the table, showing the relationship between the spray pattern and the efficiency of extinction.

On the 4-ft. fires, with the flat sprays, extinction was fastest with the batswing system producing the greatest spread, although the rate of application per sq. ft. was the lowest; on the 10-ft. fires, the smaller batswing applicator produced no extinction, but at a similar rate of application per sq. ft. the larger applicator with a wider spread produced a rapid extinction. The batswing burners were also the most economical of the applicators tested.

The drop sizes of the sprays were measured and ranged from 0.2 mm. to 1.0 mm. diameter according to the nozzle used. In these experiments, it did not appear that the drop size had any appreciable effect on the efficiency.

It is concluded that chlorobromomethane is applied most efficiently as a flat spray to cover as wide an area as possible, and should be applied to the base of the flame.

The investigation is part of the programme of the Department of Scientific and Industrial Research and Fire Offices' Committee Joint Fire Research Organisation; this note is published by permission of the Director of Fire Research. The authors gratefully acknowledge the advice and help of Dr. F. E. T. Kingman.

REFERENCE

[1] Report of the Committee on Vaporising Liquid Extinguishing Agents. *Fire Research Technical Paper No. 2*, HM Stationery Office, Dec., 1954; THE CHEMICAL AGE, 1954, 71, 1292.

Results of Experiments on Application of Chlorobromomethane by Flat Sprays to Petrol Fires

Description	Nozzles: Pressure at nozzle lb. per sq. in.	Nozzles: Delivery rate gpm. per sq. ft.	Nozzles: Delivery rate gpm. Total gpm.	Spray pattern: lateral spread ft.	Spray pattern: Throw ft.	Spray pattern: area sq. ft.	Extinction Times and Quantities Used: 4 ft. diameter (12.56 sq. ft.) Extinction time sec.	4 ft. diameter (12.56 sq. ft.) Quantity used gal.	10 ft. sq. (100 sq. ft.) Extinction time sec.	10 ft. sq. (100 sq. ft.) Quantity used gal.
Jets impinging on metal plate										
2 nozzles (3/32 in. bore)	60	0.086	1.64	5	5½	19	8	0.217	Not Measured	
1 nozzle (¼ in. bore)	30	0.039	1.16	6	7	30	8	0.155	,,	,,
Batswing burners										
A	60	0.026	1.26	10	5½	48	*3	0.063	(No extinction in 1 minute)	
B	60	0.029	3.41	16	8	122	Not measured		†14	0.80

* Mean of four tests. † Mean of three tests.

Spectrographic Monitor

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the fluoride and the ammonium double fluoride, and as beryl ore. It has been used to determine the hazard in filling mobile containers with powdered ore, in operating a briquetting press for furnace charges, in the operation of an ammonium beryllium fluoride dryer, and the firing of beryllia ware in a gas-fired furnace. In this last case, it was possible to examine the efficiency of the exhaust system, and to indicate the adverse effect of an 'air screen' introduced to prevent fumes escaping into the laboratory. The contamination of factory floors and operatives' clothing has been checked.

It is suggested that the instrument should prove of great value in assessing the hazards involved in airborne contamination with lead, zirconium, vanadium, chromium, cadmium, tellurium, germanium, antimony, manganese, etc.

Aluminium Watches

ON 13 and 17 December, Mr. Fraser W. Bruce, managing director of Northern Aluminium Company Limited, presented watches to 16 Birmingham and 7 Banbury employees to commemorate their 25 years' service with the company. Monday's presentation took place at a dinner held in Chadwick Manor Hotel, Knowle, and Friday's presentation was held in the Banbury Works canteen. Among the guests were Mr. H. C. Thomas, Mr. B. N. H. Thornely and Mr. C. P. Paton, directors; Mr. L. Fletcher, Birmingham works manager, and Mr. E. L. Ashley, Banbury works manager. The men were presented with aluminium watches, weighing less than half-an-ounce each, specially made by one of the leading Swiss watchmakers.

BISOL Prices Reduced

British Industrial Solvents announce that, with effect from 1 January 1955, the prices of BISOL acetaldehyde and paraldehyde will be reduced by £5 per ton, and those of BISOL diacetin and triacetin by approximately £12 per ton.

The new schedules are as follows (all prices in £ per ton, delivered UK):

	10 tons	1 ton	40/45 gal. drum	10 gal.	5 gal.
Acetaldehyde 100 per cent	—	137	140	160	—
Acetaldehyde 40 per cent	—	146	149	174	184
Paraldehyde, stabilised	—	150	153	173	183
Paraldehyde, technical	—	123	126	146	156
Diacetin	375	377	380	405	415
Triacetin	346	348	351	376	386

Packages are returnable at sellers' expense, except 10- and 5-gal. containers for diacetin, triacetin and acetaldehyde 40 per cent, which are non-returnable and included in the prices quoted. Allowances for tank wagon deliveries are unchanged

Midlands Society Meeting

THE January meeting of the Midlands Society for Analytical Chemistry will be held on 11 January at 6.30 p.m. in the Mason Theatre, The University, Edmund Street, Birmingham. The subject will be 'Some Aspects of the Analytical Chemistry of Titaniferous Materials' by Dr. F. R. Williams, F.R.I.C., chief analyst, British Titan Products Co. Ltd.

Analysis in titanium technology most often refers to the ores—ilmenite and rutile and the dioxide as a pigment. Due to the difficulty of dissolving the latter, most of the associated elements are estimated by physico-chemical methods. In the ores, similar remarks apply, and in addition many of the elements have similar chemical properties to titanium. An important analytical test in pigment technology is the estimation of the relative proportion of rutile and anatase crystalline modifications in a mixture.

Burts & Harvey Expansion

Burts & Harvey Ltd., of Eling House, Totton, Southampton, have now completed the first section of their new chemical factory at Spring Hill, Bursledon Road, Southampton, and their plants for the production of fumaric, succinic and malic acids will be transferred and enlarged in the New Year. The new capacity is designed to supply the whole of the United Kingdom's demands for these products and follows the company's policy of developing their chemical department. The tar distilling interests of Burts & Harvey trade as South Western Tar Distilleries.

SUCCESSFUL COMMERCIAL CHEMICAL DEVELOPMENT. Edited by H. M. Corley. John Wiley & Sons Inc., New York; Chapman & Hall Ltd., London. 1954. Pp. 374. 62s.

This book has been published under the auspices of an American organisation called the Commercial Chemical Development Association, a body of individuals devoted to the theory and practice of the development of new chemical products.

Material has been submitted by a group of members and has been revised in committee. The editor has spent most of his working life in association with Armour & Co. and has made a considerable contribution to that company's introductions into the chemical industry. The text is in the form of a guide for the managements of chemical enterprises, and is intended to assist in the selection of potentially successful new chemicals. As such it will not appeal greatly to the average chemist who is more often concerned with the satisfaction of a present industrial need rather than the creation of a fresh one.

Many will be fascinated, however, by the picture which the book presents of the almost religious fervour of American business method. Some idea of the elaborate theory which is developed around the selection, production and marketing of a new chemical is gained by the first symbolic statement in the preface 'Commercial development can be described as a collective state of mind within a company.' While much of this commercial philosophy can be dismissed as pretentious rubbish, nevertheless the book does bring together a great deal of information not previously available to the executive in a convenient form.

Although any theoretical material of this nature should be judged, not upon its ability to interpret the past, but on its capacity to predict the future, the selection of specific examples in Chapter 20 is significant. The factors which appear to boost the sales of a new product from a modest to a very large scale appear in the case histories quoted to be purely fortuitous, depending upon a new demand created by some other branch of industry. Similarly it may be felt that the commercial failures quoted cannot be attributed to any defect of judgment on the part of the sponsors, but rather to the non-appearance of a fresh market to absorb the product.—J.R.M.

RATIONALISIERUNGS-KURATORIUM DER DEUTSCHEN WIRTSCHAFT. Heft 23. Chemische Technik in USA. Carl Hanser Verlag, München. 1954. Pp. 156. DM. 10.40.

This is the German version of an OEEC report also published in French and English. The German title is much more appropriate than the English one, 'Chemical Apparatus in the USA.' A party of 11, mainly chemists and engineers each drawn from a different European country, visited 20 American chemical firms in October 1950. During their short tour, which took about one month, the visitors were very impressed by the extensive role played by the chemical engineer in American chemical industry, indeed so much so that they devote a considerable section to defining the chemical engineer and his function in chemical, constructional and other concerns. His training is described in some detail. It is suggested that there is great need to train many more in Europe and in a more practical way than by our present highly academic courses.

The amazing growth of chemical industry in the US since the first world war is attributed to the large internal market, vast mineral resources, two world wars and more particularly to the care taken to ensure that progress pays, to train technicians and specialists, to supply incentives, to allot individual responsibility, to engage high quality workers, to appreciate economic efficiency and know-how, to try new methods, to abandon old, to sub-contract rather than impair productivity by attempting to do

everything oneself, to share techniques and to standardise and simplify equipment. Other items discussed at length are chemical plant construction, wide use of measuring instruments and automatic control, catalytic processes in the oil industry, separation, extraction, distillation, heat exchange, materials of construction, transport and storage. Some items of plant described as novel, such as fluidised catalytic crackers, pebble heaters, Hortonspheres and spheroids, although perhaps not well known here in 1950, have since been put into wide use in Europe.

Among recommendations made for adoption in Europe are international standardisation of equipment, greater use of measuring and controlling instruments, acquainting the manufacturers of instruments and apparatus more precisely with the requirements of chemical industry, reduction in the numbers of apparatus types used for the same purpose, increase in size and standardisation of railway wagons, more transport by pipe-line and moving belt, greater co-operation and less disinterestedness among all workers in a firm. It is a pity that 3½ years had to elapse between the visit to the US and the publication of the report.—M.C.

EINFUHRUNG IN DIE BIOLOGISCHE REGISTRIERTECHNIK. By H. Klensch. Georg Thieme Verlag, Stuttgart. 1954. Pp. xii + 222. DM. 33.

Biologists have long relied on recording, whether of heart rhythm or bird song, as a reliable and essential method of studying vital processes. Engineers and physicists are also keen recorders. It is only comparatively recently, however, that chemists have availed themselves to any extent of the possibilities of recording reaction rates or heats, absorption spectra, furnace temperatures, variable composition of gases or the like. The wealth of methods described in this book will come as a surprise and possibly an inspiration to chemists among others.

As a lecturer of long standing on the subject, in which he professes a particular delight, the author believes that there is need for an introductory work on the principles and practice of recording. Although short the book not only meets this purpose but will also serve admirably for any who have recording problems in biology, physics or chemistry. Many references are given to specialist works and original papers. The indicating and recording of biological processes such as muscle contraction, heart beat, blood flow, respiration, composition of respiratory gases, pressure changes in blood vessels, bladder and intestines, temperature and bioelectric currents are described together with the production of mechanical and electrical stimuli and the fixing and developing of curves recorded on sooty surfaces, photographic paper and film.

The chapter on mechanical movements deals with the construction of lever systems, rotating drums, pointers, styles, lamps for sooting, deflecting mirrors, etc. The principles of mechanical, optical, electrical, photographic, photoelectric and pneumatic methods are explained and illustrated clearly with numerous diagrams. Matters such as error, sensitivity, damping speed, reproducibility are authoritatively discussed. There is a chapter on the continuous recording of volume and pressure changes in gases and liquids using gasmeters, gasometers, plethysmographic, manometric and tachographic methods. Hot wire and ultrasonic devices for continuous recording of oxygen or carbon dioxide in gases are referred to.

In the chapters on the recording of temperature and bioelectric currents electrical devices in wide variety such as thermocouples, galvanometers, amplifiers, electrocardiographs and electroencephalographs are described. The author is obviously less interested in sound recording, detection of radioactive material and photographic methods, for these are hardly more than summarised. Nevertheless this is a useful book to have around. The numerous self-explanatory diagrams will compensate for any lack of familiarity with the German language in the reader.—M.C.

THE previous edition of *German Books on Chemical and Cognate Subjects* by A. E. Cummins and S. Vince of the Chemical Society was published in 1950. A supplement has now been brought out covering books published from 1950 up to the beginning of 1954. It is stated that some of the books listed are in active preparation but others are out of print, although secondhand copies may be available from the publishers. The list covers not only chemistry, chemical technology and metallurgy but physics and mathematics for chemistry. It is published by Lange, Maxwell & Springer, of 242 Marylebone Road, London, N.W.1, and 122 East 55th Street, New York 22.

• HOME •

New Kiln Starts Production

The new sulphuric acid kiln at I.C.I.'s Billingham factory (THE CHEMICAL AGE, 1954, **71**, 975) has now gone into production. It will increase the factory's sulphuric acid production by about 73,000 tons a year.

Neftin Purchase Tax Exemption

A. J. White Ltd., Coldharbour Lane, London S.E.5, announce that purchase tax has now been removed from Neftin (NF-180) Furazolidone. Neftin, a highly effective treatment for fowl typhoid and Pullorum disease (BWD), is available in packs of 4 oz. and 1 lb.

Fisons Pest Control Ltd.

Fisons Ltd. and Pest Control Ltd. announce that as from 1 January the name of Pest Control Ltd., of Cambridge, has been changed to Fisons Pest Control Ltd. The company will continue to trade independently as previously and its headquarters will remain at Bourn, Cambridge. Fisons acquired Pest Control Ltd. some months ago (see THE CHEMICAL AGE, 1954, **70**, 847).

Scientific Workers' Wages Claim

The Association of Scientific Workers has applied to the Engineering Employers' Federation for a substantial increase in the salaries of scientific and technical staff employed in the industry. It is expected that a meeting with the employers will take place shortly to discuss this claim.

New Professorships at Manchester

Sir John Stopford, Vice-Chancellor of Manchester University, said on 21 December that he believed the magnificent lead of the City Council in agreeing to support the establishment of an independent governing body for the College of Technology would be rewarded by 'the greatest possible support' from the University Grants Committee and from industry. Speaking at the Degree Day ceremony, he said that five of the ten new professorships which had been foreshadowed had already been instituted. The first had been filled, and it was expected that an announcement about two more would be made early in the new year. Steps were also being taken to find an occupant for the chair of chemical engineering, but so far it had not been possible to find a professor of textile chemistry.

Prizes For Apprentices

At the third annual distribution of prizes to apprentices at Petrochemicals Ltd., Partington Industrial Estate, Urmston, Peter Daniels, laboratory assistant, was awarded the top prize. The chairman, Mr. Godfrey H. Owtram, made the presentations.

Monsanto Presentations

Presentations of gold watches and clocks were made on 21 December to 146 employees of Monsanto Chemicals Ltd. who had completed upwards of 25 years' service with the company. The presentations were made at the Parish Hall, Cefn Mawr, by Mr. Phillip A. Singleton, who said the event coincided with the completion of 2,000,000 accident-free man-hours at the local factory.

Technical Trade Course

Youths entering the chemical and allied industries as apprentices at Hull are to have available to them a five-year training course at the city's Technical College. Adult workers already in the industries are to be offered a shorter course. It is hoped to get the scheme into operation early in 1955. The plan is part of the national scheme drafted by the industries' Joint Industrial Council.

Price Down

The Board of Trade wholesale price index showed a slight rise for several products in November and one considerable drop. The price of synthetic detergents fell from 110.8 in the previous month (30 June, 1949 = 100) to 108.7, as a result of price cuts announced by detergent manufacturers. Disinfectants rose from 112.1 to 112.9, and insecticides, weed killers and fungicides from 123.1 to 124.0. Drugs and pharmaceutical preparations went up from 102.2 to 102.8. The prices of general chemicals remained steady.

Import Prices Up

The price of pyrites imported into the UK rose in November, according to the Board of Trade wholesale price index. Taking prices of 30 June, 1949, as 100, it reached 177.5, compared with the figure of 168.8 that had been maintained steadily for the previous year. Fertiliser prices also went up, from 171.1 in October to 172.0. Prices for carbon black and crude sulphur remained stationary at 136.0 and 160.4 respectively.

• OVERSEAS •

Austrian Sulphuric Plant

The Austrian Iron and Steel works (VOEST) in Linz has opened a new plant for the production of sulphuric acid and superphosphate from anhydrite. Production capacity of superphosphate is expected to reach 40,000 tons yearly, and together with other sources will entirely cover the domestic demand.

Synthetic Rubber Sales Up

Sales of synthetic rubber in the US in March are expected to total about 62,000 tons, the highest monthly figure on record. This is 12,000 tons more than anticipated February sales. The increase is attributed to the fact that more rubber generally is being used and manufacturers are using a higher percentage of synthetic rubber because of its currently lower cost.

New Fibre in Italy

A new synthetic fibre known as Movil is reported to be meeting success in Italy as a substitute for wool. First produced in France under a different name, Movil worn next to the skin gives a sensation similar to that of wool. It is stated to be very strong, and damp-, moth- and acid-proof.

Israel Ammonium Sulphate Imports

An order for 13,000 tons of ammonium sulphate, which had been placed in Germany by the Israeli Shilumim Corporation, has been cancelled in view of the producers' demand for a price increase. Meanwhile the I.C.I. company has allocated sterling for the import of 4,000 tons from Britain, and the import of an additional 2,000 tons will be allowed shortly. In the first half of 1954, 19,300 tons of ammonium sulphate were imported by Israel at a cost of $1,200,000. Of this, 17,100 tons was from Germany, and the rest from Belgium.

Technion Expands Chemistry Department

New research facilities for a laboratory of organic chemistry have been established at the Haifa Technion. There will be space for 12 research workers, including four candidates for Ph.D., and three postdoctoral fellows. In addition to standard organic laboratory equipment, a Perkin-Elmer double-beam infrared spectrophotometer is being installed.

Wood Seasoning Plants for India

The Government of India have accepted a recommendation by the Standing Committee of the Central Board of Forestry to set up four or five wood seasoning and preservation plants to increase supplies of treated timber for various development schemes. The Forest Research Institute, Dehra Dun, has been asked to prepare a detailed scheme for setting up the plants.

Natural Gas Pipeline

Provisional agreement has been reached for the construction of a natural gas pipeline to run from the Peace River district of British Columbia and Alberta, Canada, to the north-eastern United States. It is hoped that work on the pipeline will start next September, with gas supplies reaching the US border by December 1956.

Iraq Orders New Insecticide

A £20,000 order for endrin, a new and powerful insecticide, has been placed by the Iraqi Government. This will be used to control the spiny bollworm, which is attacking Iraq's cotton crop. At present, production is confined to the United States but Shell have made plans to manufacture endrin by adding new facilities to their chemical insecticide plant at Pernis Refinery near Rotterdam. This plant, costing more than £1,000,000 is now starting production of aldrin and dieldrin. Output of endrin from the Pernis plant is expected to begin by mid-1956.

ILO Committee to Meet

The fourth session of the Chemical Industries Committee of the International Labour Organisation will be held in Geneva, Switzerland, 7-19 February. The two technical questions on the agenda are: 'Factors affecting productivity in the chemical industries with special reference to work study and systems of wage payment,' and 'Problems of safety and hygiene in chemical industries, including classification and labelling of dangerous substances.' The Committee will also discuss a general report prepared by the office outlining recent events and developments in the chemical industries, including outlook, expansion and level of employment, welfare facilities and industrial relations.

· PERSONAL ·

The tenth annual general meeting of the Physical Methods Group of the Society for Analytical Chemistry was held in the meeting room of the Chemical Society, Burlington House, London W.1, recently. The following officers were elected for the forthcoming year:—*Chairman*, MR. A. A. SMALES, B.Sc., F.R.I.C.; *Vice-Chairman*, DR. J. E. PAGE, B.Sc., Ph.D., F.R.I.C.; *Hon. Secretary and Treasurer*, Mr. R. A. C. ISBEL, A.Inst.P.

The board of Powell Duffryn Ltd. announce that MR. JOHN CRANDON GRIDLEY, C.B.E., has been appointed a director of the company with effect from 1 January. Mr. Gridley is chairman of Vacuum Oil Co. Ltd.

At a recent meeting of the Council of the British Iron and Steel Federation MR. A. G. STEWART, chairman and general managing director of Stewarts & Lloyds Ltd., was appointed president of the British Iron and Steel Federation as from 1 January, in succession to MR. G. H. LATHAM, chairman and managing director of Whitehead Iron & Steel Co. Ltd. SIR ERNEST LEVER, chairman and chief executive of Richard Thomas & Baldwins Ltd. and The Steel Company of Wales, was appointed president-elect of the federation.

MR. A. E. HOBSON, the new Northern Divisional manager of the BTL group of companies was, until recently, the assistant home sales manager of Baird & Tatlock (London) Ltd. Before the second world war, Mr. Hobson was a research assistant at the University of Sheffield working in the Cancer Research Department. During the war he served in the Royal Naval medical laboratories, and saw service in the Middle East, Africa and the Far East. He joined BTL in 1946 as their technical sales representative in the North of England.

EDWIN R. GILLILAND, Professor of Chemical Engineering at Massachusetts Institute of Technology, has been announced as the recipient of the William H. Walker Award of the American Institute of Chemical Engineers. The award honours the memory of the late William H. Walker, also a professor at Massachusetts Institute of Technology and a pioneer in the modern concept of chemical engineering. Professor Gilliland, an authority on separation processes and applied industrial chemistry, has been cited for this recognition because of his publication record over the past few years and in particular for four papers contributed to *Chemical Engineering Progress*, the major publication of the A.I.Ch.E., in the fields of fugacity, gasification and mechanics of drops.

Babcock & Wilcox Ltd. announce that, in view of their expanding activities in Latin America, MR. A. S. PEACOCK has been appointed as manager for that territory, with general responsibility for the company's business in Latin America, including factory development in Brazil and co-ordination of policy. The appointment takes effect from 1 January.

The Association of British Chemical Manufacturers announce the appointment of MR. CHRISTOPHER J. PRATT, A.M.I.Chem.E., A.M.I.P.E., A.I.I.A., as Work Study and Productivity Officer. He will take up his duties on 3 January and will be responsible for helping members on all aspects of work study as applied to the chemical industry. Born at Wellingboro, Northants, in 1916, Mr. Pratt was educated at Gosforth Grammar School, Northumberland, and the Rutherford College of Technology, Newcastle-on-Tyne. He has wide experience in industry as a metallurgist, chemical engineer and industrial consultant. In July, 1952, he joined Eimco (Great Britain) Ltd. as chemical engineer and manager of the British Filter Division. He has also worked for the parent company, The Eimco Corporation of USA, in America and Europe.

The Council of the Institute of Metals has made the following awards of medals: *The Institute of Metals (Platinum) Medal for* 1955 to DR. COLIN JAMES SMITHELLS, M.C., D.Sc., F.I.M., director of research, The

British Aluminium Co. Ltd., Gerrards Cross, in recognition of his services to metallurgical science, to the metal industries, and to the metallurgical profession. *The Rosenhain Medal for* 1955 to DR. WILLIAM ALBERT BAKER, D.Sc., F.I.M., research manager, The British Non-Ferrous Metals Research Association, London, in recognition of his outstanding contributions to knowledge in the field of physical metallurgy, with special reference to the influences of gases and shrinkage on the soundness of cast metals. *The W. H. A. Robertson Medal and Premium for* 1954 to PROFESSOR HUGH FORD, D.Sc., Ph.D., and MR. J. G. WISTREICH, M.Sc., D.I.C., for their paper on 'Problems of the Control of Dimension, Shape and Finish in the Rolling of Sheet and Strip and in the Drawing of Wire.' The medal and premium of 50 guineas, placed at the Council's disposal by W. H. A. Robertson & Co. Ltd., is awarded annually for the encouragement of the writing and publication in the Institute's *Journal* of papers on engineering aspects of non-ferrous metallurgy. MSS. of such papers should be addressed to the Secretary, The Institute of Metals, 4 Grosvenor Gardens, London S.W.1.

MR. E. W. S. PRESS, B.Sc., F.R.I.C., has been promoted to deputy chief scientific officer, Ministry of Supply, and has been appointed director of Chemical Inspection, Kidbrooke. Mr. Press, who is 56, has been assistant director in charge of general stores at the Chemical Inspectorate, Woolwich, since 1948.

British Resin Products Limited announce that MR. T. E. LAING has been appointed a director of the company. Mr. Laing, who joined the DCL group in 1943, has been works manager and more recently general manager of the joint British Resin Products Ltd.-British Geon Ltd. factories at Barry, Glamorgan, since they were built from 1947 onward. Starting his career as a chemical engineer with the Anglo-Iranian Oil Co., Ltd. in 1922, he served for several years in Iran, becoming widely travelled in Iraq, Iran, Arabia, Syria, Lebanon, Palestine and Egypt. Following this period in the Middle East he worked for some time with South American interests—the Anglo-Peruvian and Anglo-Ecuadorian group—on refinery construction and as refinery superintendent. He later served with the Socony-Vacuum Group as operating manager in Britain, and in Germany and Italy before joining DCL. For a period Mr. Laing was attached to the 21st Army Group H.Q. as oil adviser and later as controller of German oilfields and refineries.

Changes on the Board of Quickfit & Quartz Ltd. have been announced. LORD STANMORE (83) has resigned on the grounds of age, having been a director of Quickfit & Quartz since 1946. MR. BRIAN H. TURPIN and MR. ARTHUR COCHRANE have offered their resignations. Mr. Turpin is now fully employed as managing director of the subsidiary, Q.V.F. Limited. In tendering his resignation, Mr. Cochrane, who is assistant managing director of the Triplex Safety Glass Co. Ltd., said he felt that he should facilitate the promotion of younger members. The Board have, with effect from 1 January 1955, co-opted as directors MR. D. CURTIS, the firm's development manager, MR. E. L. HARRISON, sales manager, and MR. E. S. PEARSE, works manager.

Fifty years ago, MR. HAROLD J. COTES, now managing director of British Glues & Chemicals Ltd., began his career in the glue industry at a small factory in the Midlands. To commemorate this long association, his colleagues on the board and employees have presented him with his portrait in oils, painted by Mr. Cowan Dobson, R.A. The presentation was made by the chairman of the company, SIR ROGER DUNCALFE, at the firm's recent Christmas party, when 262 of the staff attended. Sir Roger recalled his first meeting with Mr. Cotes some 40 years ago. In 1920 they began their partnership as joint managing directors of the newly-formed British Glues & Chemicals Ltd. Sir Roger referred to the affection and admiration which they all felt for Mr. Cotes, and paid tribute to his quality of leadership, his executive and administrative ability, and to his gifts of friendship and human understanding. Mr. Cotes, in reply, voiced his appreciation of the support given to him throughout the years by Sir Roger and by the directors and staff. He referred briefly to the growth of the company over the years and said that this had in large measure been due to the confidence which had been reposed in him, and the unfailing loyalty of all those who had served under him. Four guests at the party that night (Messrs. B. S. ADDERLEY, J. L. FENTON, G. T. FINNEY and H. GROOM) had each served under him for more than 40 years.

Publications & Announcements

THE cables and connectors of temporary electricity supplies used in the chemical industry in maintenance shops, for operating electric tools, for emergency lighting and power and other purposes, have to withstand vigorous and very often brutal treatment. With this in mind, the Plessey Co. Ltd., of Ilford, Essex, have made a range of heavy duty plugs and sockets for joining electric cables which will withstand very rough handling without damage. There are four basic housings, made of forged aluminium bronze, for plugs and sockets. These are: a cable unit, for terminating and anchoring cables; a panel unit, fitted with a flange for mounting in a fixed position, wiring connections being made directly into the rear; a cable coupler, to be used in conjunction with a cable unit when it is desired to join two cables; and a panel mounting coupler, which is similar to a panel unit except that an outlet and fittings are provided to enable a cable to be connected at the rear. The plugs and sockets are of great physical strength, it is claimed, and will stand up to the weight of passing vehicles. They are completely weatherproof.

* * *

A BOOKLET issued by the London and Home Counties Regional Advisory Council for Higher Technological Education gives details of special courses in higher technology that are to be held during the spring and summer terms at colleges in the region, which extends roughly from Brighton to Hatfield and from Dagenham to Weybridge. The courses are those which do not regularly appear in college calendars or prospectuses as part of a grouped course or as subjects offered for endorsement on Higher National Certificates. Most of them are part-time, usually evening, courses, but there are some full-time ones included. Copies of the booklet are available at 1s. 6d. each, post free, from the secretary of the council, Tavistock House South, Tavistock Square, London W.C.1.

* * *

A LARGE modern cold storage building has been opened in Belfast by Gland Supplies Ltd. for the storage of animal glands and other organs which are used in the production of various pharmaceutical by-products, such as insulin, which cannot be manufactured by synthesis. The building, which was originally a chair factory, comprises an air lock and three cold rooms in which the temperature may be reduced, at times, to minus 47° F. The walls and ceilings throughout the store—totalling an area of 6,322 sq. ft.—are lined with Warerite laminated plastics in a satin finished mottle pattern. This material was used because of its good physical characteristics at low temperatures and its hard-wearing and hygienic qualities. The panels for the ceilings were supplied by Warerite Ltd., cut to size and bonded to a $\frac{3}{8}$-in. thick insulation core.

* * *

A NEW coagulant—apparently a polyelectrolyte—has been announced by the Dow Chemical Company. This material, manufactured under the trade name of Separan 2610, is expected to be of particular interest in the mining industry, where it can be used advantageously in ore recovery. It also offers an improved solution to almost all problems in which a separation of solids from water suspension is necessary.

The new product is effective in amounts as small as one part per 2,000,000 parts of solids, and the amount of agent used may be reduced as much as 30 times, compared with other similar agents. Its use has decreased material losses by as much as 80 per cent, and increased total product recovery up to 5 per cent. Among its other advantages is a high capacity for increasing the filtration rate in separation processes.

Separan—manufactured as a white amorphous flake which is dissolved for use as a dilute solution—can be stored indefinitely without need for preservatives.

* * *

CORROSION has been defined as destruction of metals by electro-chemical agencies in contrast to erosion by mechanical means. When a corrosive reaction takes an electrochemical course then destruction of the metal is usually severe. A short article outlining the causes and mechanics of electrochemical corrosion appears in the winter edition of *Building Topics* which is obtainable free of charge from the publishers at their new head office, Tretol Ltd., Tretol House, The Hyde, London N.W.9. Tel.: Colindale 7223.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

PLASTICRAFT LTD., London N.W.— 18 November, debenture to Martins Bank Ltd. securing all moneys due or to become due to the bank; general charge. *Nil. 4 April, 1953.

Satisfaction

ORGANON LABORATORIES LTD., London W.C.—Satisfaction 25 November of charge registered 17 April, 1947.

New Registrations

Clenge Products Ltd.

Private company. (541,378.) Capital £100. Manufacturers of and dealers in chemicals, etc. The permanent directors are: Brig. Jas. L. P. Macnair, Gerald S. Bell and Robt. B. Durlacher. Reg. office: Thoracy House, 34 Smith Square S.W.1.

Sadler & Company (Chemicals) Ltd.

Private company. (541,480). Capital £100. To acquire the business now carried on by Sadler and Co. Ltd. at Middlesbrough and elsewhere and all the undertaking, property and assets relating thereto (excluding trade debts owing to and due from the said company (in respect thereof and also the business of the said company now carried on at Evenwood, Co. Durham, and such parts of the business now carried on by it at Middlesbrough as are connected with the distillation or manufacture of tar, naphthalene, anthracene, benzole, crude tar acids and other products derived from tar and with the storage and shipment of creosote, benzole and petrol). Subscribers and other particulars are similar to North Eastern Tar Distillers (Sadlers) Ltd. (See last week's issue.)

Sadler & Company (Coke Ovens) Ltd.

Private company. (541,479). Capital £100. To acquire the business of coke and gas producers and processors of ancillary products carried on by Sadler and Co. Ltd. at Evenwood, Co. Durham and elsewhere (exclusive of any business carried on by the said company at Middlesbrough or Carlton, Yorks.). Subscribers and other particulars are similar to North Eastern Tar Distillers (Sadlers) Ltd.

Sadler & Company (Storage) Ltd.

Private company. (541,481). Capital £100. To acquire that part of the business now carried on by Sadler and Company Ltd. at Middlesbrough and elsewhere which relates to the storage and shipment of creosote, benzole and petrol; and to carry on the business of wharfingers, shippers, merchants, brokers, etc. Subscribers and other particulars are similar to North Eastern Tar Distillers (Sadlers) Ltd.

Kumar (London) Ltd.

Private company. (541,510.) Capital £1,000. Manufacturers of and dealers in drugs and medical, veterinary, biological and pharmaceutical preparations, etc. The permanent directors are: Shri G. Chandra Surendra K. Agrawal and Arthur F. Harris. Reg. office: 91 Belmont Hill, S.E.13.

Collie Chemicals Ltd.

Private company. (542,235.) Capital £100. To carry on the business of manufacturers of and dealers in chemicals and chemical products, etc. Subscribers (each with one share) are: Wm. Y. Thornton, John N. Davie. Mrs. Irene C. Collie is the first director. Secretary: John N. Davie. Registered office: 16/18 Clapham Junction Approach S.W.11.

Company News

Frederick Braby & Co. Ltd.

Sales turnover during the year was a record, it was reported at the annual general meeting of Frederick Braby & Co. Ltd. on 21 December. The chairman and managing director, Mr. F. C. Braby, added, however, that the margin of profit obtainable on most of the firm's products was reduced owing to keener competition and increases

in wages and salaries under national agreements. Mr. Braby said that demand for the company's principal products was excellent, and he hoped to be able to report a substantial improvement this year. A final dividend of 6¼ per cent on the ordinary stock was approved.

Bowmans Chemicals Ltd.

Bowmans Chemicals Ltd. are resuming dividends on the £50,800 ordinary capital with a recommendation of 10 per cent for the year ended 31 October. The latest payment was a 7½ per cent final dividend for the year 1950-51. Profits, subject to audit, were £18,672, compared with £20,440 for the previous year, after a higher income charge of £21,237 (£4,000) and providing £1,159 (nil) profits tax.

Branch Office

Riley Stoker Co. Ltd. announce that with effect from 1 January their Midland area manager, Mr. A. J. Salter, can be contacted at their new branch office at 43 Burton Road, Melton Mowbray, Leics. Tel.: Melton Mowbray 495.

Semi-Micro Analysis

THE Bradford Chemical Society in conjunction with the Department of Chemistry and Dyeing of the Bradford Technical College announce that a symposium on 'Semi-Micro Analysis' and an exhibition of chemical apparatus are to be held at the college on 11 and 12 February.

The symposium will start at 7 p.m. on 11 February with an introductory lecture on 'Methods of Micro-Analysis' by P. Holt, B.Sc., Ph.D., D.I.C., M.Inst.Biol., F.R.I.C. On 12 February there will be three lectures, one in the morning and two in the afternoon. They will be on 'Organic Semi-Micro Analysis' by G. Ingram, A.R.I.C., 'Inorganic Semi-Micro Analysis' by H. Holness, M.Sc., F.R.I.C. and 'Micro Balances' by G. F. Hodsman, B.Sc., Ph.D., F.R.I.C.

The exhibition of chemical apparatus will be held in the College Hall from 10 a.m. to 6 p.m. on both days. Many well-known manufacturers of chemical apparatus are exhibiting and particular emphasis will be placed on apparatus used in micro- and semi-micro analysis. There should be many examples of new apparatus, it is stated, and new techniques will be demonstrated.

Next Week's Events

TUESDAY 4 JANUARY

Incorporated Plant Engineers

London: Royal Society of Arts. 'The Writing and Presentation of a Technical Report for a Non-Technical Board of Directors' by W. J. Dickie.

Institute of Metal Finishing

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. 'Practical Platers' Forum.'

WEDNESDAY 5 JANUARY

Incorporated Plant Engineers

Southampton: Polygon Hotel, 7.30 p.m. 'Industrial Instrumentation' by C. M. V. Benwell.

THURSDAY 6 JANUARY

Institute of Metal Finishing

Manchester: Engineers' Club, 7.30 p.m. 'Trends of Progress in Electrodeposition' by Professor J. W. Cuthbertson.

FRIDAY 7 JANUARY

Soctiey of Instrument Technology

Fawley: Copthorne House, 7 p.m. 'Industrial Instrumentation' by L. Yoxall.

Market Reports

LONDON.—The markets have opened in their usual quietness after the Christmas holiday, and with the end of the year approaching, stocktaking and new contract rates are receiving the main attention. Price changes reported so far include a reduction of about £3 5s. per ton in the price of methylene chloride, and caustic potash is lower by £1 per ton, as from 1 January. Formic acid prices are unchanged. There is little of outstanding interest in the coal tar products market.

MANCHESTER.—Trading conditions on the Manchester market for heavy chemical products have been relatively quiet since the reopening after the Christmas holidays. This is the normal experience at this time of the year, though the dullness has been accentuated by the closing down of a number of cotton mills in Lancashire for extended periods because of unsatisfactory order-books. It is not expected that the market will get into full stride again until well into next week, when a reasonably good resumption of the demand from most of the principal outlets is anticipated.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

ARMSTRONG SIDDELEY MOTORS needs a **CHEMIST** as assistant to the Chief Chemist in their Rocket Division for research in an unusual field, with a wide range of materials. Degree or A.R.I.C. essential. Good prospects. Apply giving details of experience to Reference **CG/RL1, TECHNICAL PERSONNEL MANAGER, ARMSTRONG SIDDELEY MOTORS, COVENTRY.**

CHIEF CHEMIST required for synthetic phenol plant near Pontefract—experience in manufacture of phenol and sulphuric acid an advantage but not essential—position is of considerable responsibility and offers good prospects—contributory pension arrangements available. Apply with particulars of age, qualifications, experience and salary required to **SECRETARY, SYNTHETIC CHEMICALS LTD., KNOTTINGLEY, YORKS.** (marking envelope "Chemist").

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'GARDNER' ENCLOSED EDGE RUNNER—5 ft. 4 in. diam. bed.
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3,000 gal.—13 ft. 6 in. by 7 ft. (New).
2,400 gal.—20 ft. 5 in. by 5 ft.
2,000 gal.—10 ft. 9 in. by 6 ft. 6 in. (New).
1,000 gal.—11 ft. by 4 ft. 6 in. (New and Second-hand).
500 gal.—5 ft. 9 in. by 4 ft. 6 in. (New and Second-hand).

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9,000 gal.—21 ft. 4 in. by 9 ft. diam.
250 gal.—New T.V.O. storage.

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2,700 gal.—12 ft. by 10 ft. by 6 ft. deep.
1,550 gal.—Aluminium, 7 ft. by 6 ft. by 6 ft.
1,200 gal.—8 ft. by 4 ft. by 6 ft., riveted.
500 gal.—5 ft. by 4 ft. by 4 ft. (New).
New 100-1,000 gal.—black or galvanised.

RECTANGULAR OPEN TOP

12,800 gal.—Sect. steel, 4 ft. by 4 ft. plates complete with cover.
1,200 gal.—Sect. Braithwaite, galvanised.
750 gal.—cast iron.

OVAL—LORRY MOUNTING

2,500 gal.—single compartment, aluminium metal-sprayed inside.
2,500 gal.—single compartment, black (2 off).
1,500 gal.—4-compartment, extensive fittings (5 off).
1,000 gal.—Cylindrical 4 compartment, petrol
1,000 gal.—single compartment, complete with steam coils, ex-tar transport (2 off).
600 gal.—4-compartment with all valves, etc.
450 gal.—single compartment.
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PATENTS

THE Proprietors of Patent No. 582908 for "**PROCESS FOR THE CLARIFICATION OF GLYCEROL LIQUORS OBTAINED BY THE FERMENTATION OF NATURAL OCCURRING CARBO-HYDRATES SUCH AS MOLASSES,**" desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to **Haseltine Lake & Co.**, 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietors of Patents Nos. 593,768 and 597,379, for "**IMPROVEMENTS IN OR RELATING TO THE PRODUCTION OF CELLULOSE,**" and "**METHOD FOR THE PREPARATION OF PURIFIED CELLULOSE**" respectively, desire to secure commercial exploitation by licence in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings Chancery Lane, London, W.C.2.

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